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COMPOSITION AND NUTRITIVE VALUE OF THE DIFFERENT PARTS OF WHEAT.

I.

THE cereals, and especially the wheat, have, during the past half century, formed the subject of many investigations. In spite of all this the best method of preparing the grains for human food is far from being to everybody's satisfaction, says Prof. A. Girard, in the *Journal de la Meunerie*. According to one side, every portion of the grain takes part in the nutrition of the body, while the other side claims that certain parts of it must be separated before use. This difference of opinion induced me several years ago to investigate the chemical composition and nutritive value of wheat, not only of the whole kernel, but successively of its different parts.

The miller divides the wheat into three portions, which are bran, germ and starch kernel, and in order to keep these three parts entirely separated, it is a very delicate matter. To do this effectually, I place the grain into distilled water until it begins to soften; then I split it into two longitudinal halfs, and remove the contents by means of a small wooden scraper. In this manner I obtain the skin free from germ and starch kernel, and after drying, the weight of the skin can be determined exactly. To obtain the germ, I split the grain while dry, and the one half always allows an easy separation of the germ. Applying this principle to different species of wheats, I have found that the kernel, on the average, is composed of

Bran	14.36
Germ	1.43
Starch kernel	84.21

The anatomy of the wheat grain is too well known to need repetition. Analysis proves that the bran is especially rich in nitrogenous, fatty, and mineral substances. I have found the first named to be 18.75 per cent.; the second 5.60, and the third 4.68 per cent. of the whole bran. These substances are, however, distributed in a peculiar manner in the different layers. An analysis first of the whole cuticle, and then of its different layers separated from each other, convinces me that the principal deposit of nitrogenous, fatty, and mineral substances is found in the most interior layers of the whole skin of the grain.

Analysis gives for the outer layers of the bran:

Non-nitrogenous cellulose	27.94
Nitrogenous substances	2.41
Mineral substances	0.65

or 31 per cent. of the weight of the bran; for the middle layer,

Non-nitrogenous substances	5.98
Nitrogenous substances	1.25
Mineral substances	0.46

or 7.69 per cent. of the weight of the bran. The interior layers are according to the analysis composed of

Cellulose	36.73 per cent.
Nitrogenous	15.32 per cent.
Fats	5.60 per cent.
Mineral substances	3.66 per cent.
	61.31 per cent.

and this, compared with the composition of the external layers forthwith demonstrates that the nutritive value of the latter is so insignificant as not to require any attention, whereas the former need our special care as their presence or absence in the food would cause a difference in the quantity of gluten amounting to two per cent. of the whole weight of the grain.

According to the investigations of Mege-Mouriers, reported to the Paris Academy of Sciences, the cells of the interior layers of the bran contain a peculiar ferment, the cerealine, which during the bread-making process acts upon the gluten as well as upon the starch, and produces, even with white flour, a colored, fatty, indigestible bread. By means of ingenious devices Mege-Mouriers has tried to destroy the activity of this ferment and thereby retain a large quantity of nitrogenous substances which he considered digestible for the human organism.

The indisputable proof of the indigesti bility of these nitrogenous substances by man, however, has led me to adopt entirely different conclusions.

HOW TO DETERMINE THE ADMIXTURE OF ORGANIC OR INORGANIC SUBSTANCES IN RYE AND WHEAT FLOUR.

(Prize essay of the German Millers' Association by Dr. L. Wittmack, Professor of the Agricultural College at Berlin.)

Translated by THE MILLING WORLD.

IX.

2. *Ergot. Claviceps purpurea.*

Since ergot finds a useful application for many medicinal purposes, we do not see it as often among the rye as formerly; ergot, separated from the grain commands in German drug stores a price of 50 cents per kilogramme, often more, and the reason for a more careful separation is obvious. But in spite of the best cleaning machinery a few fragments of the ergot will find their way into the flour. An admixture of one per cent. is said to be harmless; two per cent. becomes injurious, while five per cent. of ergot in the flour causes serious diseases. It can be detected when the flour is well shaken with chloroform; this brings the red-brownish particles of the ergot to the surface. Water, with a small addition of muriatic acid, can be substituted for the chloroform; it likewise reveals the presence of the ergot by small red-brown dots. If one spoonful of flour is boiled with from five to ten times its quantity of water acidulated with muriatic acid, and the paste is poured into a white flat dish, the small blood-red or red-brown dots can be seen floating on the surface, even if ergot is present only in very minute quantities. The microscope tells us that these little colored particles are composed of almost square cells in regular rows, which form the external layer of the ergot and are of a red-brown color. The internal cells differ but little in form from those of the external layer.

Ergot contains a large quantity of fat, and the paste made as above, will sometimes reveal the presence of the ergot by the abundance of fat globules to be seen under the microscope. Chemical tests for ergot are considerably more difficult than many writers like to make us believe. Prof. Vogl claims that his test fluid, described before, will produce a flesh-red color in the presence of very small quantities of ergot, while 5 per cent. colors very intensely. My experiments have led to different results. Pure fresh ergot, when heated with Vogl's fluid, colors to a roseate hue, but rye flour to which 5 per cent. of ergot has been added, produces a pale flesh color, while an addition of 2 per cent. of ergot gives only a very faint discoloration.

Boettger's method does not differ much from the above. He mixes a sample of the flour in a test tube with an equal volume of acetic ether, adds a few crystals of oxalic acid and heats the whole over a water-bath to near the boiling point. If on cooling the fluid in the tube appears reddish, we have ergot present in the flour. There are other methods, but they need not be mentioned in this connection.

One misleading point in this color determination is, that some of the weeds produce, under the same conditions, a similar color, and any test for ergot by such means must take this fact into consideration. Spectroscopic analysis is liable to the same error, caused by the same reddish-brown pigment found in ergot as well as in some of the weeds. Unless the ergot is present in very minute quantities, the following method by Wittstein, is the most simple and exact. A sample of the flour is heated with a solution of caustic potash; if ergot is present, the trimethylamin which is formed produces a very distinct odor of salt herring pickle. It is well for the experimenter to heat a sample of the potash solution first, so as to be acquainted with its odor, and not confound it with that generated by the ergot. But lately we have been told by Mr. Poehl that the odor of trimethylamin is not an infallible indication of the presence of ergot, as all putrefying flours will throw off, under such a treatment, that same particular smell. Poehl claims that the injurious properties of ergot do not so much reside in the ergot itself, as in its ability of hastening the putrefaction of the flour with which it is mixed. [See THE MILLING WORLD Feb. 21: about the putrefaction of rye flour.] Experiments with the violet pigment of ergot have demonstrated that water as well as alcohol solutions of from 20 to 50 per cent. strength, dissolve it. An addition of sulphuric, muriatic or oxalic acid hastens the solubility as well as an addition of alkalies, which latter also intensify the color. A weak solution of borax extracts the violet pigment from the pulverized ergot, even at the temperature of the room; an increase of the heat hastens the process, and the solution becomes of an intensely violet color.

According to Palm as small a quantity as one-half per cent. of ergot can be detected by the following method:

The flour to be tested is thoroughly dried and mixed with from 10 to 15 times its weight of alcohol of 35 to 40 degr. T., and a few drops of ammonia. The mixture is subjected to a temperature of 30 to 40 deg. C., or higher if speedier action is required. The solution is then carefully filtered under pressure, the resulting liquid mixed with acetate of lead in excess, and the precipitate collected on a filter. This precipitate is slimy and difficult to filter and must be pressed slowly through the paper. The residue is then treated with a cold saturated solution of borax, aided by a slight warming.

If ergot is present in the flour, all the violet coloring matter is found in the precipitate caused by the acetate of lead; from this it is taken by the borax solution which then becomes of a violet color characteristic to the presence of ergot. An addition of concentrated sulphuric acid again precipitates the coloring matter from the borax solution in dark spots. If more delicate reactions are needed, we can evaporate over a water-bath the alcoholic extraction of the flour to a moist residue; extract this again with alcohol of 30 to 40 per cent. strength; precipitate with acetate of lead and test the precipitate with a solution of borax. Strange to say, this reaction does not occur after the flour has been baked into bread. Undoubtedly baking destroys the pigment of the ergot entirely, and the other organic alcaloids and acids partially. But in experimenting with bread any precipitate obtained by the acetate of lead is an almost certain indication of the presence of ergot, for pure bread gives, under the same treatment, no precipitate at all, or at best, only a very minute quantity of spotted looking sediment,

To test bread for ergot, the former must be dried, pulverized, and warmed for 5 or 10 minutes with from 10 to 15 times its weight of alcohol of 40 degrees. The mixture is then filtered through charcoal, the filtrate evaporated to a moist consistency over a water bath; this again is extracted with alcohol of 40 degrees and filtered through charcoal. The filtrate is mixed with acetate of lead in excess, and the precipitate gives us indications of the quantity of ergot contained in the bread. This precipitate is formed from the organic acids contained in the ergot, and if obtained from a material of average quality, it amounts to about 8 per cent. Less than one per cent. of ergot cannot be detected in bread by this method.

RUST AND MILDEW.

We hear so much about rust in connection with the cereals that the following article taken from Broadstreet's will perhaps prove of interest to our readers, as giving the result of the latest investigations on the subject in a comprehensible and condensed manner: Until about a year ago it was often a source of much wonder that the red rust which is so frequently prevalent on the wheats in spring was by no means invariably followed by an extensive attack of mildew.

There was even, apparently, a conflict between science and experience upon this point; for, whereas the men of science declared that rust was the second stage in the life of the parasitic fungus which begins with cluster-cup and ends with mildew, farmers in England regarded rust with comparative composure, and many even said it was a sign of a good yield. The mystery has been at least ostensibly solved by Dr. Plowright, of King's Lynn, Norfolk, England, who last spring and summer investigated the subject thoroughly, and discovered that there are two varieties of rust, one comparatively harmless and the other extremely mischievous. The first he terms Uredo rubigo-vera —a very unfortunate use of an old name for a newly-discoverd variety—and not the true rust. To the second he gives the name of Uredo linearis, applied to all the rust of plants. Last year Mr. Plowright appeared to be of opinion that the former rust did not develop into mildew; but now he has found that it has the same three stages of life as the latter—cluster-cup, rust and mildew. The mildew stage of the early rust, however, does so little harm that it has passed unno-

ticed. Dr. Plowright names its three stages as follows:

EARLY RUST (*Puccinea rubigo-vera*).

Cluster-cup stage,	Rust stage,	Mildew stage,
Æcidium asperfolii on various plants of the Borage family.	*Uredo rubigo-vera*, on wheat and barley.	*Puccinea rubigo-vera*, on wheat and barley.

He calls it early rust because its attack comes early in spring. This is the rust which has been so abundant on wheat, barley and oats in England during the present season. The spores of it, Dr. Plowright says, are quite distinct from those of the more dangerous rust, which does not make its appearance in England before the end of June. This early rust, he says, extends over the greater part of an affected leaf, but is best developed upon the under surface; and this it is which often covers with a yellow powder, the boots of those who walk through wheats early in spring. When examined, this rust is seen to be in the form of a large number of small yellow spots, very little larger than a pin's head, but elongated, and not round. The important point to notice, however, is that comparatively few of the spores have broken through the outer cuticle of the leaf. In the course of a few weeks the yellow spots become black, and this is the mildew stage of early rust, or Puccinea rubigo-vera. The cluster-cup stage, Dr. Plowright says, is very rare in England, and he has never seen it. The rust reproduces itself without the cluster-cup stage.

The spots of the rust which precede mildew proper are larger and less numerous than those of early rust, and the spores always break through the outer cuticle of the leaf and the stems of the wheat plant, and every spot develops infallibly into the black mildew with which every farmer is familar. Dr. Plowright names the three stages of life as follows:

WHEAT MILDEW (*Puccinea graminis*).

Cluster-cup stage,	Rust stage,	Mildew stage,
Æcidium Berberidis, on barberry.	*Uredo linearis*, on wheat.	*Puccinea graminis*, on wheat.

He says that investigations made by friends of his in Australia show that the rust from which Australian wheat suffers so seriously is the rust of the mildew proper. But there is no barberry in Australia, except in a few gardens. What plant takes the place of barberry in producing the cluster-cup stage of mildew Dr. Plowright does not tell us; nor does he say that the rust of this mildew reproduces itself without the cluster-cup stage in Australia, as he says early rust does in England.

It appears to us that the subject requires further investigation before the final word can be said upon it. Is Dr. Plowright quite certain that the spores of the two forms of rust are specifically distinct? That is the crucial point of his alleged discovery; because until that is absolutely proved, it is possible to hold the theory that the early and late rusts are only modified forms of the same fungus, one rendered less virulent than the other, perhaps, by having a different host-plant for the cluster-cup stage. The subject is of great importance and one worthy of the attention of the most eminent mycologists.

Dr. Plowright has contributed to the *Mark Lane Express* a full account of the discovery which he claims, and it is from an advanced proof of that article with which we have been favored that we have taken his leading statements.

NUTRITIVE VALUE OF BRANNY FOODS.

At a recent meeting of the College of Physicians of Philadelphia, a valuable paper on this subject was presented by Drs. N. A. Randolph and A. E Rousel. The following are their conclusions:

The experiments of Rubner leave no doubt that a white bread contains more assimilable nutriment than one made from the whole wheat does, but this does not render it a desirable foodstuff for exclusive use. On the contrary, a weaned but still quite young omnivorous mammal thrives better upon an exclusive diet of bran bread than on white, and, presumably, because the earthy and alkaline salts are present in greater abundance in the former, and also because the indigestible constituents tend to give to the intestinal contents that bulk and consistence which are essential to the hygiene of the digestive tract. But, as has been shown by Edward Smith and others, the branny scales are needlessly irritating, and unduly hasten the food but partially digested. An observation worthy to be mentioned in this connection is that of Rubner, who finds that, while the presence of much woody fiber and harder cellulose in the intestinal contents induces the passage of stools containing an excess of undigested proteid foods, the absorption of fats under the same conditions is not materially affected. The end which popular hygiene attempts to effect by the retention of bran in breadstuffs can be better attained by other means. Thus, the nutritive salts of food so frequently lost in ordinary methods of preparation are readily restored by the concentration of the liquor in which meats and vegetables are cooked into a soup stock, as is practiced in almost every French kitchen. Again, the various fresh green vegetables used as salads yield in abundance these inorganic foodstuffs, the presence of which we have seen is indispensable to normal tissue activity. A further advantage of these and other succulent vegetables lies in the fact that their cellulose, while efficient in giving proper bulk and consistence to the stools, is, as compared with bran scales, soft and unirritating to the digestive tract. From the facts, old and new, which have been presented, the following deductions appear to us justifiable:

I. The carbohydrates of bran are digested by man to a slight degree.

II. The nutritive salts of the wheat grain are contained chiefly in the bran, and, therefore, when bread is eaten to the exclusion of other foods, the kinds of bread which contain these elements are the more valuable. When, however, as is usually the case, bread is used as an adjunct to other foods which contain the inorganic nutritive elements, a white bread offers, weight for weight, more available food than does one containing bran.

III. That by far the major portion of the gluten of wheat exists in the central four-fifths of the grain, entirely independent of the cells of the fourth bran layer (the so-called "gluten cells"). Further, that the cells last named, even when thoroughly cooked, are little if at all affected by the passage through the digestive tract of the healthy adult.

IV. That in an ordinary mixed diet the retention of bran in flour is a false economy, as its presence so quickens the peristaltic action as to prevent the complete digestion and absorption, not only of the proteids present in the branny food, but also of other foodstuffs ingested at the same time.

V. That, inasmuch as in the bran of wheat, as ordinarily roughly removed, there is adherent a noteworthy amount of the true gluten of the endosperm, any process which in the production of wheaten flour should remove simply the three cortical protective layers of the grain would yield a flour at once cheaper and more nutritious than that ordinarily used.

BIG CROPS: THEIR EFFECT ON BUSINESS.

Three or four days more of such weather as has recently prevailed throughout the Northwest, says the St. Paul *Pioneer Press*, will put the wheat crop out of reach of the dangers usually to be feared at this season. Ever since seeding time the conditions have been, for the most part, exceptionally favorable. The growing grain has escaped with only slight and local damage from the many possible causes of injury that always threaten, and is now passing the most critical stage. Fierce and successive heats are justly dreaded at the time when the grain is full of milk, just assuming the plumpness and consistency which mark maturity. It is then that a week of intensely hot weather will frequently dry up the berry, leaving it small and shriveled, inferior in quality and light in weight. But that period is just now being safely left behind, and when it is once passed the promise of harvest is reasonably well assured. At present the days are such as to hasten ripening without too quickly drying up the juices of the kernel, and every day of fair sunshine, with brisk breezes that mitigate the heat of noon and insure delightfully cool nights, is adding thousands of dollars to the cereal wealth of the nation for the coming year.

Of course there is still a possibility of serious and general loss. The wheat crop is never absolutely safe from chances of injury until it is ready for the market. A succession of heavy and continued rains after harvesting is fully under way might yet destroy the promise of the year. But there is no reason to apprehend such extraordinary misfortune, and with even ordinarily good weather from this time on the Northwest will gather in the best crop that it has grown for ten years past. A succession of detailed reports have prepared the public for this announcement. The prospect is that the yield of 1884 will be unsurpassed in either quantity or quality by that of any of its predecessors. More number one wheat will be put upon the market from the Northwestern fields than has ever yet been produced even in this region, so justly famed. The natural result of this is one pleasant for the farmers, and all whose interests depend upon them, to contemplate. For it means more money and a renewal of general prosperity, even though an abundant crop elsewhere should hold market prices at a low figure. In past years light crops and an inferior quality of grain have told against the producer far more severely than a decrease of prices. With the prospect now before us, the most unfavorable market conditions would still permit him to realize handsomely from his year's labor, would still bring him profit greater than that permitted by the conjunction of high prices with poor crops; while the surety of an abundant food supply is a pleasant one for every man, since all are food consumers, since reduction of the cost of living is an essential of national prosperity.

It is evident that the crop outlook has already had its effect upon the larger material interests of the country. To this is undoubtedly traceable some of the reaction which has made itself apparent in the stock market, and concerning which those who argue that stocks fluctuate only in accordance with speculative manipulations are in somewhat of a quandary. A fruitful crop year means that millions of bushels of grain are to find their way from the harvest fields to the market and to the seaboard. It means renewed activity of trade, new demands upon the part of those whom the bounty of nature has rendered more prosperous, and a great increase of traffic and of traffic receipts. It is an outlook which tends to make railroad securities more desirable investments, by ensuring the increase of railway earnings and of the margin of profits. It is easy to see how quickly this cause will operate when money has been kept out of employment only by uncertainty as to the future, and when capital exists in abundant quantity, needing only a reasonable certainty of profits to draw it from retirement. The assurance of a good crop yield is precisely what has been wanted to reinvigorate the market, and to restore confidence in the possibility of employing capital in directions that are both remunerative and secure. The country has received that assurance, and the result follows so quickly that the sequence of cause and effect cannot be overlooked. It is, therefore, only reasonable to suppose that the certainty of a fine year for the farming interest will prove the turning point in the uncertainties and distrusts that have for some time prevailed in the financial and commercial world.

As we have noticed, the yield and the character of this year's crop are now very little doubted. Such injuries as have been sustained from smut, from heavy storms, and from the thousand and one causes which may mar the fortunes of any individual, are entirely local. Instances of this kind there are, but, while they may be heavy personal misfortunes, they cut no figure in the general aggregate. Being assured, then, of a prosperous year, of a magnificent crop and of increased activity of trade which so surely follows when nature kindly does her best, the country will speedily begin to recover from the trying period of dullness that has affected every industry. No one expects that failures will cease, that money can be had for the asking, and that trade expansion and speculative ventures will immediately become again the order of the day. These results are as improbable as some of them are undesirable. But resting on the sure foundation of abundance of agricultural wealth, the business interests of the country will take new heart, confidence will return in presence of the season's guarantee, and once more the quick pulsings of healthful life will animate the country, which already feels in the impulse that has stirred its centers the influx of new vitality and power.

BUFFALO AND GRAIN.

As compared with many up-lake towns of much smaller size and less commanding position, Buffalo, says the *Express*, a reporter for which has been interviewing Mr. U. J. Livingston, grain inspector for the Merchants' Exchange, is not taking the position she ought to demand in either lake or rail traffic. Toledo, for instance, with a quarter of her population, has become a factor in the grain trade, which is a great credit to her push and discrimination. Through the efforts, principally, of a very enterprising grain firm of Toledo, who have been able to take advantage of the right side of the facilities afforded by the railways centering there, Toledo is able to command the trade of a large district westward, and consequently of the corresponding district eastward that consumes the grain it handles. It is estimated that by this control of the business Toledo gets about two cents a bushel out of the wheat she handles. St. Louis, though a great city, is not a natural grain centre, yet she has been able to grasp a large proportion of the trade. A single firm in that city now keeps a dozen men traveling on the road east and west, while not a single Buffalo firm has a man traveling in either direction.

The remedy for this conservative style of things is to find parties who will come here and establish the business that the situation demands. Already there is promise of such a movement. A gentleman from St. Louis possessed of ample means and knowledge of the business, has lately looked over the ground, and it is thought that he may locate here. The necessary step to be taken is to establish communication with the leading producing centers, so that supplies can be drawn in quantity from them instead of from the commission houses on the way. After that, railroad co-operation must be secured. As to making sales, there is much less difficulty. Buffalo millers, as well as those farther east, can readily be induced to buy here if they can do so at no disadvantage. Already the establishment of a regular sys-

tem of grading has increased home sales largely. Leading millers who formerly sent their orders to the west now buy here, for they know beforehand what quality of grain they are to get. But the grade establishes the quality alone. The price is another matter. What is wanted is some control of the means of supply and the routes that carry the product. With this accomplished, Buffalo can compete with the western markets, for she can then buy as low as they, and is not obliged to pay for passing the grain through the hands of another set of dealers.

There is also another phase of the subject which requires attention. Buffalo ought to command the situation eastward and supply all consumers of grain in that direction. Those who observe the large amount of flour coming here by lake may suppose that it is consumed here or eastward, but the fact is very little of it stops in America. There is quite generally a desire to build up a local market for flour. Millers easily establish a home reputation for their brands that pretty effectually drives out western ground flour. They already supply their home demand, and they are ready to buy at home if they can do so without loss. Already quite a movement in this direction is observed this season. The establishment of houses that will exhibit the grading of grain and demonstrate its reliability, and that will push sales eastward by means of traveling agents, is the step that must be made to insure success. Mr. Livingston is sure that this can be done, and that it will be done at no distant day. He is about making a trip to the Northeast, in which St. Paul, Milwaukee and Duluth will be visited. The effort to bring about the establishment of a vigorous home market will not be lost sight of while he is away.

With a firm hold of the home market, Mr. Livingston sees a general extension of the lines abroad as quite among the possibilities. Where is the wisdom in sending wheat to Liverpool when flour ships more readily than grain, and can be made here just as cheaply as it can abroad? It is only by mixing their inferior wheat with ours that European dealers are able to maintain any sort of competition with us. The stir lately made in American meats can easily be duplicated in flour if the effort is made properly. A letter from an American writer traveling in England advocates the establishment of agencies throughout that country and others as fast as government opposition is removed, and says the people already demand both American meat and grain, and will continue to do so until their free admission is permitted. It is not necessary to urge Buffalo into an undertaking so far reaching as this. Larger centers and more experienced dealers must lead the movement. But what Mr. Livingston maintains that Buffalo should do in justice to her position and her rapid growth is to demand control of the grain trade eastward for a large area. There is apparently no reason why it should be given up to smaller or far distant towns to the westward. The suggestions are made by him entirely in the interest of the city and its grain handlers. Not in a spirit of condemnation, but with a wish to arouse our conservative operators, are the defects in the local management pointed out. Who will be first to untertake the work roughly outlined?

Since writting the above it is learned that the prospects of a western firm shipping from Buffalo has become a fact. Mr. T. M. Harris, connected with the extensive firm of R. S. McCormick & Co., of St. Louis, has been in the city during the past week and made arrangments to handle a large amount of grain through an agency here. This agency, though nominally given to a Buffalo firm, is to be subject to Mr. Livingston's inspection. It is promised that about 200,000 bushels a week will be handled for the St. Louis parties. The 100,000 bushels cargo of wheat brought down by the Onoko on her last trip was shipped by the same parties. Mr. Harris is confident that Buffalo can be made a great central shipping point and is anxious to establish the fact that Buffalo grading of grain is reliable. With this accomplished there will be no difficulty in sending grain directly from here to any part of the world. This new movement may be the first step that has so long been needed to set the ball in motion.

THE EFFECT OF ADMITTING A NEW PARTNER.

The legal effect of admitting a new partner is one of the questions on which contrary views have been maintained. The latest and most satisfactory deliverance on this question was, according to the *Insurance Monitor*, by Justice Miller a few weeks ago in the U. S. Circuit Court at St. Paul, in the case of Drennen vs. London Assurance Corporation. After the policy was issued the insured firm of Drennen, Starr and Everett, of Minneapolis, admitted a new partner named Arndt, which it was claimed by the company, vitiated the insurance. As upwards of $100,000 were involved in the suit, it was vigorously contested, and Judge Miller, in his charge to the jury, spoke on this point as follows:

"If the property be sold or transferred, or any change takes place in the title or possession." Many changes may have taken place in the title and also in the possession, without a sale or transfer of the property to another party; for instance, a sale by one partner to another has been held by the courts not to be such a sale or transfer as is included in this policy, and for the very obvious reason that the possession does not change; it remains where it was—the title remains, perhaps in the firm, although one member of the firm may have gone out; the question we have got to solve is whether the introduction of a new partner into the partnership firm whose goods are insured, is such a change as vests him with an interest which he did not have before, and vests another man with a right of control of the possession, and to have charge of the property, and will avoid this policy. Without going on to cite the authorities, we are both of the opinion that this is such a change as by that language was intended to avoid and forfeit the policy.

The sale of the transmution of the various interests between the partners themselves, and nobody else having the control, and leaving the possession where it was, does not invalidate the policy; but the introduction of a new partner with an investiture of an interest in him which he did not have before, does avoid the policy.

There are two things with regard to which insurers are always cautious, tenacious and anxious. One of them is the character of the men with whom they make the contract, and the other is the character of the man who has possession of the property, especially if it be movable property that is insured; and it is easy to see why this is so. They may very well know that the man or men with whom they deal when the contract is made are cautious, prudent business men, honest, and for a long time successful in business. With those men they contract without hesitation. They have a right to know who those men are with whom they contract with regard to the possession of the property. They make a contract with A because they know him, or because they have heard of his character—because they understand that he is honest and fair, and they deal with him just as you would deal with one whom you know to be reliable; you will seek to deal with honest men only. Now it is against all the principles of contracts to say that in dealing with one man or with two men, that those two can afterwards, acting without the consent of the other party, introduce another man into the contract who has all the rights and all the control which those two had before; because that man may be known to be a scoundrel by the insurance company, and if that rule prevails the other parties have a right to introduce the veriest scum of the earth and men who have half a dozen times been engaged in the destruction of property to get the insurance. So you may sell the goods insured, but you cannot sell the policy unless the company agrees to it. We are of the opinion that if Mr. Arndt was, within the meaning of that policy, introduced into that partnership, and became a member of it before the loss, and acquired an interest in the goods, that the policy was forfeited.

NEW YORK COMMERCIAL CATECHISM.

What is a bull?

A bull is a person who talks much of the prosperity of this country, the vast earning capacity of the railroads, the big crops out West, and then eats a ten cent sandwich for dinner.

What is a bear?

A bear is a person who talks much of the depression of the iron trade, over-production, too many railroads, and that everything must go to smash. In the evening he occupies a front seat in the crack theatre of the town.

What is a Broker?

A broker is one who, in consideration of a certain commission, properly sees to it that you "go broke."

What is a Put?

A put is an instrument in writing which secures to you the right of putting your money where you will never see it again.

What is a Call?

A call is an instrument of torture benevolently issued by a capitalist. The profits you thought you would make generally begin after it has expired. Brokers sometimes accept them as margins.

What is a Margin?

A margin is a sum of money put up on your deal. It has a patent right for always growing smaller, and is related by marriage to a stop-order.

What is a Stop-order?

A stop-order is an electric machine used in firing you out of the market.—*Wall Street News.*

The MILLING WORLD
and CHRONICLE of the GRAIN and FLOUR TRADE.

PUBLISHED EVERY THURSDAY.

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Correspondence is invited from millers and millwrights on any subject pertaining to any branch of milling or he grain and flour trade.

Correspondents must give their full name and address, not necessarily for publication, but as a guarantee of good faith.

This paper has no connection with any manufacturing or mill furnishing business. Its editorial opinions cannot and will not be influenced by a bestowal or refusal of patronage. It has nothing for sale, but its space to advertisers and itself to subscribers.

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THE AMERICAN EXHIBITION IN LONDON.

THE proposed American exhibition in London in 1886 appears to make a very favorable impression abroad, if we are allowed to judge from two pamphlets on the subject lately received by THE MILLING WORLD. It is certainly an object worthy of support to exhibit to the sister nation the complete workings of American manufacturers, not only their finished products, as is the rule in other exhibitions, but illustrating the manufacture of their wares from the beginning to the end in full activity.

The interest in this exhibition is largely increased by the fact that a Colonial exhibition is to be held in London at the same time, and visitors will thus be able estimate the relative superiority of American, Australian, Canadian and Indian products.

But while we fully understand the value of a fire engine corps, a militia regiment, and other such institutions as adjuncts to the exhibition as illustrating America, we fail to see what advantage the average Englishman will derive from the proposed American theater, negro minstrel troups, Wall Street broker's office, roller skating, rifle and revolver practice, billiards, and numbers of similar devices which are to be exhibited as illustrating American private life and American amusements. If we are to carry these latter elements abroad it would be hard to tell where to stop, and an exhibition of an average mechanic's home, taken from actual life without any change whatever, would, it seems to us, teach the Englishmen more useful knowledge about America than the exhibition of a California wine shop. If the tastes of certain classes of Americans are to be illustrated by the exhibition of a negro minstrel troup, the display of a Texas bull fight or a cowboy party lynching a horse thief may illustrate another phase of American life to be found over wide territories, or a few "Common Council Chambers" in full activity may teach the Englishmen, how well regulated and how gentlemanly are the proceedings of such legislative bodies.

While we fully appreciate the exhibition of American ingenuity and handicraft in every respect, we fail to see where the benefit is to be derived from an exhibition of the private life and tastes of the people, because they are so varied that it must appear an impossibility to do justice to even a few.

Forms of application for space can be had by applying to Gen. C. B. Norton, 7 Poultry, London, E. C. Perhaps some of our mill furnishing establishments will add to the success of the exhibition by sending over a model mill producing American flour for the benefit of the British brethren. Such an exhibit would, unquestionably, do more towards a diffusion of knowledge about "how these things are done over on this side," than any description or lecture, no matter how long or how carefully written, and will allow a fair comparison of the different British milling systems alongside of the American roller mill.

WHAT a wonderful thing is human sentimentality. Every newspaper is at present turning sentimental over the so-called Arctic horrors. After they have bewailed the fearful loss of life and the uselessness of Arctic explorations, the climax is attained by the most recent reports, which can be embodied in the one word "cannibalism." It may be a little out of place in a technical journal to speak about such matters, but when all daily papers appear to take only one side and express their disgust and sorrow, it seems the duty of even technical journals to present at least a few points on the other side. Why do we look upon cannibalism as something so very horrible? Simply because education has taught us so, and all the sentimental writers of the day would undoubtely consider it a more heroic deed for a man to starve to death in preference to eating flesh of his dead comrade to keep himself alive. Man will, in cases of emergency, shoot his faithful friend, the horse, which has perhaps saved his life more than once, and subsist on the flesh to keep from starving. He will kill the dog, who while receiving the death blow may yet lick the hands of his slayer, and by eating his best companion will prolong his own life. Why should he be so very sensitive about eating the flesh of dead men who were, perhaps, less dear to him, than horse or dog were to others. We shudder at the idea of eating a clean cat, but enjoy the meat of the porker, or the fowls, who delight in finding their food in dunghills. We feel a creeping sensation all over at the suggestion of making a meal of a snake, but we eat an eel with relish. Numerous other instances could be quoted to show how civilization has influenced the choice of our foods. We sympathize with the ship-wrecked mariner who kills his fellow sufferer in a struggle for the possession of a raft; we pity the men who in cases of panics, burning houses or theaters, trample over the living forms of their nearest relatives in order to save their own precious lives; but when men, by slow starvation, with death staring into their faces, stoop to eat the flesh of dead companions, we cry "horror, cannibalism!" As civilization is after all only an artificial institution and the slow growth of centuries, men in cases of emergency will break through the artificial bonds with which civilization surrounds them, and reassert their brute origin by a display of that trait which is common to all: self preservation. And if we read of men starving to death, resorting, as the last means of substaining life, to cannibalism, do not let us look upon it with horror and disgust, but as something quite in keeping with the divine law of nature which teaches self preservation. Put yourself into their place before passing judgment. The largest half of Lieut. De Long's party could perhaps have been saved, if they had thrown off the sentimentalities of civilization and obeyed the laws of nature by eating their dead companions; and if Greely's men had not resorted to cannibalism it is a grave question how many of them would be alive today to tell the tale.

OUR esteemed contemporary, the *Miller and Manufacturer*, persists in discussing the question of "cheat and wheat." Well, of course, we cannot help that, and if the editor has been a "practical agriculturist" himself, as we infer from the tone of his writing, his opinion is, undoubtedly, strongly pronounced on the subject. Although we cannot claim the proud distinction of having been a "practical agriculturist," we will enlighten our e. c. in regard to what we *do know* about the question under discussion. We know about as much biology as first-class botanical and zoological gardens in connection with a large herbarium and good teachers are able to infuse into a human being of average intelligence, with a taste for natural sciences, during school and college life. Although witnessing a large number of, and having performed a few, experiments ourselves, we have never, *never*, NEVER, seen one form of life change suddenly into another form; the highest we ever accomplished in this line was a *variation*, and in this we are supported by all the leading botanists of the world, whose authority we still persist in preferring to the opinion of our e. c. But in order to bring such an unprofitable and entirely useless discussion to a close, we will make the following proposition to the *Miller and Manufacturer*: Supposing our e. c. states the different conditions which, according to his idea, are able to change wheat into cheat, in writing to either one or more of the directors of the different agricultural experimental stations of the United States, with the request to settle the question experimentally for the benefit of the agricultural population of the country. If any of these gentlemen are able to change, according to instructions, the wheat into cheat, *we* will pay all the expenses; if they do *not* succeed, the *Miller and Manufacturer* will have to do it. It seems that such a manner of settling the dispute ought to be satisfactory to all, and end the discussion in harmony and good feeling.

THE tendency of people to interpret any statement in the worst possible form, is strikingly illustrated by an article in the *Chicago Times*. It has heard, or read, that wood flour manufactured for paper making in the Catskill Mountains, of New York, is shipped *unmarked* in bags to its destination, and it forthwith jumps to the conclusion that it is used to adulterate flour, for if used for honest purposes, why should it be "unmarked?" That single word is sufficient to arouse all possible forms of suspicion in the pure mind of the *Times* and in view of the many different forms of adulterations of our food, it asks for reasons why it should *not* suspect that the product of the Catskill Mountain pulp mills is used for the adulteration of flour? We would like to know what other reasons it *has* to suspect any such fraud besides the word "unmarked?" Ignoring the fact that ground wood retains the odor of wood for a long time, it cannot, by any means, be reduced to so fine a product as flour, and any admixture of the two substances could be determined by smell as well as by touch. Besides wood flour is so light, compared to the true article, that an adulteration would be limited by the bulk alone, if by nothing else; and what miller would care to spoil 192 lbs. of good flour for the sake of adding three or four pounds of adulteration. In spite of assertions made that flour is mixed with other substances, well authenticated instances of such practice are missing, at least for cases where the fraud has been committed by the millers, and if any one of them should be desirous of gaining an unsavory reputation in that way, better, or at least better paying, substances can be found to adulterate flour than wood pulp, and the "suspicion" of the *Times* is nothing more than a sensational hypothesis without any foundation whatever.

THE Bankers' Association, to which we referred recently, has met at Saratoga and adjourned. The practical profits to the public at large that can be derived from this meeting, as judged from the press reports, consists of nothing but the suggestion to establish a central bank in New York city for the receipt of country deposits. All other leading problems, such as the additional or increased security of banks, speculating with the money of other people, defaulting officials, etc., etc., in which the public would take a direct interest, were left severely alone, or at least not made public. Perhaps the discussions at the meeting were highly interesting to the bankers, but the reports of their proceedings indicate a vast amount of theorizing from insufficient data, and the public is just as ignorant about banking transactions now as it was before the meeting. Whether such transactions have to shun the light of publicity, or whether the members of the Bankers' Association consider it below their dignity to discuss such every day matters, is a question which we are unable to decide at present.

THE views recently expressed by the New York *Produce Exchange Reporter* that the low prices of wheat were not due to overproduction, but to a constant decline of the prices of transportation, receive the support of the London *Economist*, which, in a review of the wheat prices during the past one hundred years arrives at the conclusion that the means of communication are at present so vastly increased and less costly than they used to be, that "it is quite possible to have consumers paying less and the original producer obtaining more for a commodity, simply by effecting a reduction in the intermediary charges." There is no sense, remarks the *Reporter*, in comparing present and former prices without taking into account the reduction in the cost of transferring the wheat from the original producer to the consumer.

THE German Government is working hard to divert the stream of emigration towards other lands than the United States. This has been tried at various times, but, so far, the success attained has never been worthy of the labor expended. The latest wrinkle is a colonization scheme on the banks of the Congo, where Germans will be, at any rate, far enough removed from American influence; but the question is whether they will go, and judging from past experience, there seems to be no fear that the quota of German emigrants that annually reach the shores of the United States will be materially reduced by the founding of colonies in equatorial Africa.

A REPEAL of the usury laws, which would leave the price of money to be regulated by the law of supply and demand like other commodities, was strongly advocated at the recent Banker's Convention at Saratoga.

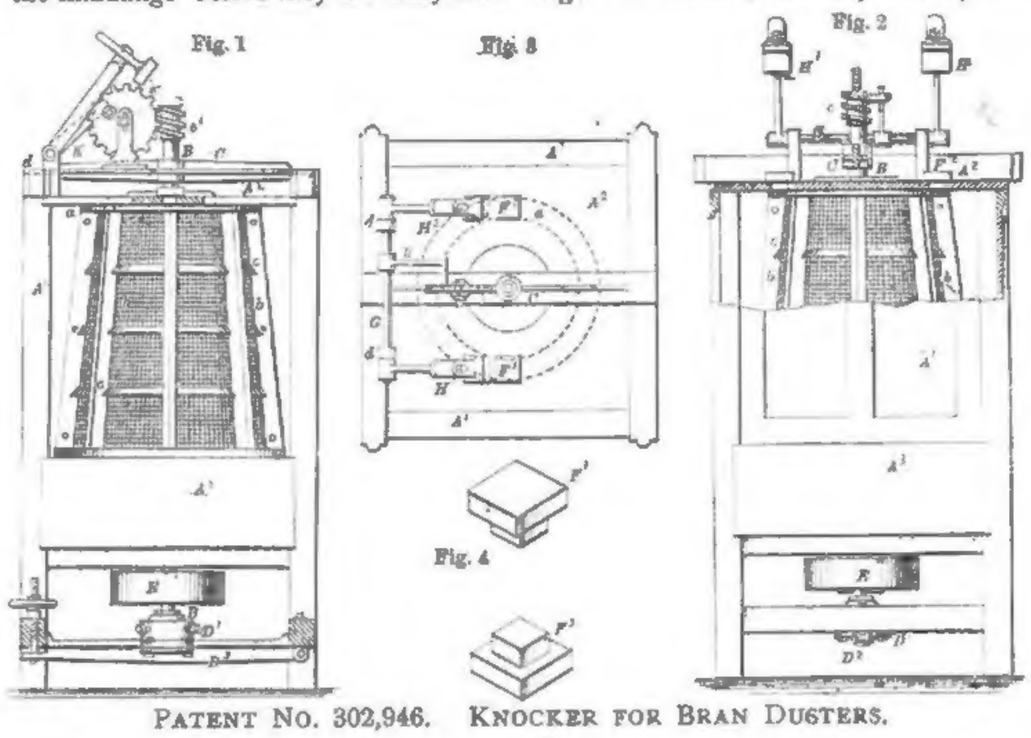
THE revised flour tariff of Switzerland will henceforth tax all milling products with 1 fr., 25 cts. per meter-centner, an increase of 25 per cent., while the tariff on grain remains unchanged at 30 cents per meter-centner.

NEW INVENTIONS

IN MILLING APPLIANCES.

KNOCKER FOR BRAN-DUSTER.

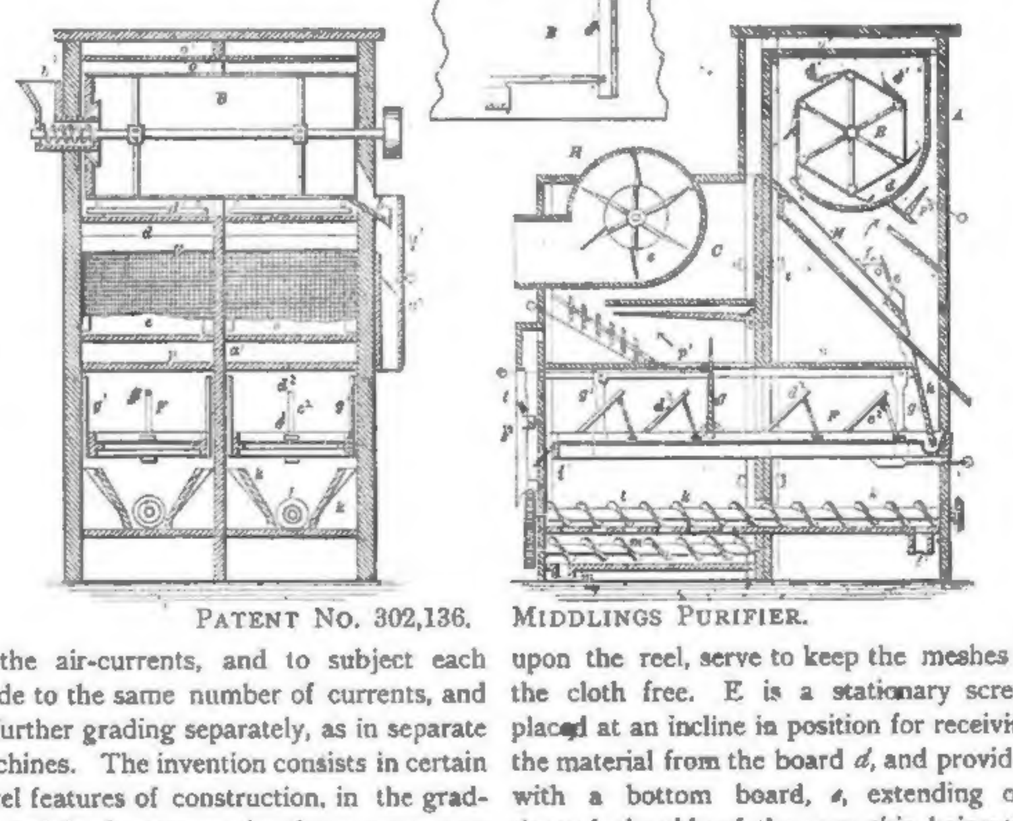
Patent No. 302,946, dated August 5, 1884, to Michael Joseph Schech, of St. Paul, Minn. Fig. 1 is a semi-sectional side elevation. Fig. 2 is a semi-sectional rear elevation; and Fig. 3 is a plan view of a bran duster, showing the improved knocking mechanism attached thereto. Fig. 4 are enlarged perspective views of the knocker-blocks removed. This invention is designed to effectually remove the adhering dust, etc., from the bolting cloth of upright bran dusters and similar machines, and may be applied to any form of such machines; but for the purpose of illustration it is shown applied to one of the well-known forms of bran-dusters. A′ being the outer casing, supporting an upright central shaft, B, to which conical beater-arms are attached inside a stationary bolting-cloth-covered conical frame, as shown. This shaft B runs at the top through a bridge-tree, C, and is supported at the bottom by a tram-pot, D′, and adjusting-lever D^2, so that the shaft can be adjusted higher and lower. E is the driving-pulley by which the shaft may be revolved. The stationary conical bolting-cloth-covered frame is formed of an upper ring, a', resting against the under surface of the top A^3 of the casing A′, and a bottom ring, a^2, resting upon a floor or division plate, A^3, attached to the frame A′ near its bottom, these two rings being connected by upright ribs b. This forms a circular conical frame or reel, to the inside of which the bolting-cloth is secured. Angular rings c are arranged around the outside of the bolting cloth and between the ribs b, to still further support the cloth and preserve its rotundity. $F' F^2$ are two wooden blocks formed with their upper parts, and with said smaller parts fitting into holes in the top A^3 of the frame A′, and resting upon the top of the upper ring, a', at opposite sides of the machine, the said enlarged upper parts forming shoulders to support the blocks upon the top A^3, and prevent them falling through in the event of the removal of the conical reel-frame. G is a rock-shaft journaled by its ends in standards $d' d^2$ upon top of the frame A′, and having secured thereto two hammers or knockers, $H' H^2$, adapted, when lowered down, to rest with their faces in contact with the upper enlarged ends of the blocks $F' F^2$. The shaft B extends up above the bridge-tree C, and is provided with a worm-pinion, e', adapted to engage with a worm-gear, e^2, journaled in a standard, g', fast on the bridge-tree C. By this means the revolving motion of the shaft B will be communicated to the worm-gear e^2. h' is an arm fast by one end to the shaft G, and extending forward and adapted to be acted upon by a pin, h^2, projecting from the side of the gear e^2, so that when the gear is revolved the pin h^2 will run beneath the arm, h', raise it up, and also elevate the hammers $H' H^2$, and then, when the pin passes out from under the end of the arm h', the hammers will drop upon the blocks $F' F^2$. These blocks resting directly upon the frame of the conical bolting-cloth-covered frame, and the parts of the latter being all firmly and rigidly connected together, these blows of the hammers $F' F^2$ will vibrate and jar the entire surface of the bolting cloth and shake the adhering dust loose therefrom. The shaft C and worm e' will revolve at a speed of about three hundred revolutions per minute, and the gear e^2 will revolve at about eight revolutions per minute; hence the hammers will strike about eight blows per minute, which is often enough for ordinary purposes. The worm-gear e^2 is adjustable in the standard g', and the latter is adjustable upon the bridge-tree C, so that a larger or smaller worm-gear may be arranged thereon at will, to increase or decrease the number of blows per minute to adapt the machine to different qualities of material.



PATENT NO. 302,946. KNOCKER FOR BRAN DUSTERS.

MIDDLINGS-PURIFIER.

Letters Patent No. 303,136, dated August 5, 1884, to David Lanley Ellis, of Brookville, assignor of one-fourth to Michael H. Risinger, of Saltsburg, Pennsylvania. The object of these improvements is to construct a middlings-purifier that shall save all of the fine middlings and flour-dust entering the machine. Another object is to obtain a machine of large capacity and occupying comparatively little floor-space, as well as to save the grading-machines, spouting, and other appurtenances required by the different machines for which this is a substitute. A further object is to effect a first grading of the middlings before they are subjected to the air-currents, and to subject each grade to the same number of currents, and to further grading separately, as in separate machines. The invention consists in certain novel features of construction, in the grading-reel, in the screens, in the arrangement of the air passages, and means for regulating the currents, and in other parts for insuring the effective operation of the machine. Figure 1 is a vertical longitudinal section of the machine, taken through the grading-reel on line $y\ y$ of Fig. 2. Fig. 2 is a vertical transverse section on line $x\ x$ of Fig. 1. Fig. 3 is a detailed plan view of one of the combined scrapers and knockers of the grading-reel. For the purposes of convenient transportation the frame of the machine is made in two parts, as shown most clearly in Fig. 2, A being one portion and H the other, and the two are connected together by bolts a, (see Fig. 2,) which being removed the two parts can be readily transported, each portion of a convenient size, and not too bulky for passing through doors. The machine is also constructed in sections longitudinally from two up to ten, and these may be made separable, if required. Two sections only are shown, divided by a vertical partition, a', and according to the number of sections, so the middlings are graded by the reel on entering the machine. B is the grading-reel, of any suitable construction, and extending through the several sections. At one end is the feed-spout b^9, and at the other end is a discharge-spout, b, for the tailings from the reel. In a chamber, C, is the suction-fan c, which serves to maintain the air-currents in all the sections of the machine, although a second and a third fan may be used, if necessary. In the several sections the screens, air-passages, and other parts are alike, and as follows: Beneath the reel B is fixed a concave board, d, which, at one side, is extended above the reel, and serves to catch and hold the material passing through. To the reel scrapers d^2 are pivoted so as to fall upon the board d and carry the accumulated material over the edge of the board, and they also, by falling upon the reel, serve to keep the meshes of the cloth free. E is a stationary screen placed at an incline in position for receiving the material from the board d, and provided with a bottom board, e, extending out through the side of the case, this being the first delivery of the machine, the material delivered being the finest in that grade. For keeping the cloth of screen E clean spring-arm e' is provided, having a stem, f, designed to be adjustable, and having a rubber knocker, f', and vibrated by an eccentric, g, for bringing the knocker into contact with the screen-frame. The screen E is provided with a cant-board, h, extending downward to carry the material for passing off the end of the screen to a trough in the head of vibrating screen below for further separation. F is the vibrating screen suspended by springs g' and provided with a trough or cavity, h', at its upper end, into which the cant-board h projects, as above stated. This arrangement is for trapping the space at the bottom of the board to prevent any suction of air from the space above, thereby allowing the exact regulation of currents upon the screen F. At i are shown an eccentric and strap connected to this screen for vibrating it, and the screen is fitted at its lower end with a tail-board, i'', for delivery of material passing over the screen. In order to keep the screen F free cleaners are attached to the frame, so as to project upward, and to these are attached stems e^2, having rubber knockers at their ends. The spring-arms are set in motion by the vibration of the screen with the result that a continuous tapping of the knockers on the screen takes place. Beneath screen F are gathering-boards $k\ k$, forming a hopper, in which is fitted a conveyer, l, for carrying the material sifted through the screen to the spout l''. Slides m are fitted in the bottom of the hopper, and beneath that a second conveyer, l^2, for carrying back to a spout, m', such portion of the material as is desired. The arrangement of air-passages for insuring separate currents is as follows: By an inner partition, o, an air-passage, o', is formed from fan-chamber C over the reel B and communicating with the space above the screen E. A valve at p^2, fitted for operation by a handle, p^3, furnishes the means for regulating this current. The screen F is separated from the action of this current by a horizontal partition, p, in which is an opening, p', that gives communication to the fan-chamber. The separation is necessary, as stronger currents are required after the material leaves the screen E. It is of further advantage that menns be provided for regulating the currents through screen F, so that the current at one end can be made stronger than at the other. For that purpose a valve, q, extending the whole width of the screen-chamber is pivoted above the screen-frame, and extends through the opening p'. On one of its pivots outside the case is to be placed a handle, whereby the valve can be moved back and forth in the opening p', and thus the current through the opening be thrown more or less to either end of the screen. To regulate the whole current, the single valve s and series of shutter-valves r are fitted beneath the opening s' in fan-chanber C. The valves r are all connected to a stem, r', for their simultaneous adjustment. By moving valve s downward the current is weakened, and when valves r are closed and valve s rests upon them, the current is etnirely cut off from screen F. By these various means the exact regulation of the currents can be attained. In the tailings from all middlings-purifiers, there is always more or less material too coarse to pass through the screens, and which has heretofore been used only for very low-grade flour on aceount of the difficulty of separatit it from the refuse. By the means next described air-currents are employed for separating this material, so that it may be used for high-grade flour. At the end of tail-board i'' of screen F is fitted an aspirator-spout, t, the upper end of which communicates by means of an opening, t', left between the casing and a semi-partition, with the space beneath valves r, and thence to the fan-chamber. This insures an upward current through the material falling from the tail-board, and the refuse being lighter than the flour particles, the former is carried to the fan. A valve, t^2, in spout t is provided for regulating the current. A similar arrangment is fitted in connection with tail-spout b of reel B. u is an air-spout covering the tail-spout b, connected by an extension, u', with the fan-chamber. This spout has a regulating-valve, u^2, and a series of slots, u^3, for regulating the separation. The directions of the various currents hereinbefore mentioned are indicated by arrows. It will be seen that the various currents, though separate and separately controllable, all lead to one fan-chamber, and that the material in all the various stages is subjected



PATENT NO. 302,136. MIDDLINGS PURIFIER.

to air-currents that can be readily regulated to suit its condition. The advantages of the primary grading and the subjection of the different grades to independent means for further separation will be readily apparent. The capacity of the machine is largely increased, and the work of many machines can be done in the one machine occupying but little space. The work is also said to be better done, and with no waste.

SCIENTIFIC AND MECHANICAL

FEEDING BOILERS.

THE difference of practice or judgment may be not only radically different, says the *Manufacturers Gazette*, but that difference may be precisely the difference between safety and danger when multiplied into any number of applications.

A correspondence has sprung up from the specifications recently printed from the pen of a man that we are glad to call our personal friend; and yet there is such a difference between what he advises and what the best practice of to-day calls for, that we cannot, in justice to all, allow it to pass without questioning.

Modern practice has entirely done away with the feeding on the fire sheet. The following out of this principle has proved dangerous, has caused many an explosion, many a job for the boiler maker. It has occasioned no end of trouble (where it has been followed with a new boiler) for a while to those who have followed with better practice. So many devices are in use for obviating this serious difficulty that it would need several illustrations to properly show what has been and is being done. Feeding boilers on the fire sheet might have done twenty-five years ago; it is bad practice today. While the boiler insurance companies might not decline that kind of a risk, they would certainly advise modification.

Blowing off boilers is a subject for separate treatment. It is never advisable to attempt to blow off a boiler with two, three or four inches of water left in the boiler. It is an old saying, and a true one, that water cannot be made to run up hill; neither can the sediment in the bottom of a boiler be made to raise itself three or four inches for the sake of finding an outlet. Good practice among the best boiler makers places the blow-off on the back sheet at the bottom in such a way that every drop of water, and every particle of sediment, can be blown out and off. And all these things are being sifted out by practice and the engineers who are working, and a great many curious things are found out when we come to follow them up. We shall have more to say on this subject very shortly.

A NEW MOTOR FOR TOWING.

Trials have recently been made at Berlin with what its inventor calls a water locomotive. The motor is to be used in rivers with a strong current, or in rapids, for the purpose of utilizing the power of the current itself in cable towing. The apparatus, exhibited in a model, consists of two paddle wheels, carried and supported by two watertight cylinders. Those form the frame work of the whole apparatus and the anterior end is so arranged as to hold a floating rudder which not only guides, but also prevents, by its peculiar construction, any access of floating substances to the paddles. The towing cables pass over the apparatus and the power generated by the current on the paddle wheels is transmitted in the most simple manner to the drum which holds the cable. While the water locomotive tows loaded boats without the use of any steam against the current, the return trip can either be made, free from the cable, by the aid of the current alone, or by the use of the cable simply gliding over the drum. Rapids can be passed in this way by utilizing the force of the water; the end of the cable anchored in the river above and passing over the drum of the boat, will allow the current to turn the paddle wheels and propel the boat upstream.

The trials made were pronounced very satisfactory. The paddle wheels of the model boat had a diameter of about 16 inches and these with a current of about 2¼ miles per hour, were able to tow with ease a boat with two men. The full size paddle wheels will have a diameter of 8⅓ feet, and the apparatus is supposed to tow two boats loaded with ten tons each in a current of three miles per hour.

THE DOORWAY OF FURNACES.

The *Locomotive* concludes that probably every man who owns or has run a boiler has experienced a vast deal of trouble with the cast iron mouth pieces around the furnace doors. These pieces invariably warp, crack, and burn out in a short time, and the fire brick lining falls down, the cast iron front becomes, burned, and where the boilers are set with the flush front setting, the portion of the shell which projects beyond the front tube sheet gets overheated, which generally results in its fracture, and in many cases the longitudinal seam where the head is attached to the shell is so severely strained that it begins to leak, and sometimes this leakage is very difficult to stop, owing to the joint being permanently strained. This warping and burning away of these castings may be prevented by simply slitting them back from the edge for about one-half the depth. The slots should be from one-half to one-fourth of an inch in width, and may be from eight to twelve inches apart over the furnace door. This width is necessary, as they close up gradually under the influence of the intense furnace heat.

* * The "illumination inspector," of Dresden gives the following explanation of the ignition of flour dust by electricty generated by the belting of machinery: "In many flour and meal mills the dust has become ignited without the cause having been discovered. I have now, from experiments, become firmly convinced that electricity developed by belts can cause such disasters. In most factories, other than flour mills, the quantity of metal present and the arrangement of the iron-framed machines is such that a connection among them is established sufficient to conduct safely away the electricity. It is, however, different in flour mills, especially where French buhr stones are used, which are made of separate pieces bound together by thick iron bands. The latter are not connected with one another, but isolated by the non-conducting stone. Rims, therefore, which are next to the driving pulleys and belts (generally located just below stones when cog-wheels are not used, and pulleys almost equal in diameter to the stones,) become surcharged with positive electricity; and, according to the known principles of electricity—as shown in the Leyden jar, for instance—the next nearest rim or rims will, by induction, develop negative electricity. These opposite forms of force having arrived at a dangerous degree of tension, the leaping of an intense spark from one stone band to another would ignite the excessively inflammable flour dust. To guard against this danger, it is simply needful to connect the iron spindles of the stones together by a thick wire, a metallic bar being at the same time located nearly touching both stone rim and driving pulley. In all other industrial works the precaution would be advisable, that no isolated ironwork should be near pulleys and belting when combustible materials are also in the immediate neighborhood."

* * When a building is to be built, says the *American Machinist*, either for mill, factory, or dwelling, consultation is had with an architect of experience and reputation, and by him the plans are drawn as required to suit the taste and pocket of his employer. Now let the boiler builders show by their works and intelligence their ability to properly construct and intelligently explain the merits of their designs in boiler engineering, and it is safe to predict that much of the business now carried on by consulting engineers will be transferred where it properly belongs—to the intelligent, careful boiler engineer.

* * Bearings made of glass are now being experimented with in the rolling stock of railroads, in regard to their frictionless quality. This material is a hard, clear substance, and must wear down smooth and give a fine bearing surface for an axle to rest upon. It is a non-conductor of electricity, if not of heat, and the fine particles have as good a chance to work down the bearing of the axle to a running fit as in the grinding in of a valve seat for a brass valve, and much power is expected to be saved by converting the wearing of a journal into some other agency than by converting it into heat.

* * A composition for removing scale from steam boilers has recently been patented. The composition consists of a decoction of tan bark ooze and catechu, logwood, chestnut leaves, spruce hemlock leaves gall nuts, sumac bark, carbonate of soda, oil of sassafras and alcohol. If that mixture does not make the inside of a boiler sick enoogh to eject scale or anything else not riveted to the sheets, there is no use trying doctoring any longer for the purpose, remarks an exchange.

* * The first wheat raised in new world was sown, we are told, by the Spaniards on the Island of Isabella, in January, 1494, and on March 30 the ears were gathered. The foundation of the wheat harvest of Mexico is said to have been three or four grains carefully cultivated in 1530, and preserved by a slave of Cortes. The first crop of Quito was raised by a Franciscan monk in front of the convent. Garcilaxo de la Vega affirms that in Peru, up to 1650, wheaten bread had not been sold in Cusco.

* * After a careful weighing of all available evidence, Professor Attfield, F. R. S., concludes that there is not the faintest cause for alarm concerning the occurrence of tin, lead, or any other metal in canned food. When injury has resulted from the eating of such food, it has probably been due to unsoundness of the food and not to poison derived from the can.

* * The Ohio experimental farm, which is conducted in connection with the Ohio State University, will send to the World's Exposition in New Orleans next October a large exhibit of the results of its work, a single item of which embraces 100 varieties of wheat to be shown in grain and in the straw.

* * The United States Fish Commission has this year distributed throughout every State and territory in the Union 80,000,000 whitefish, 30,000,000 shad, and 10,000,000 of the Salmonidæ species. The commission has also distributed 12,000 German carp.

* * Of the 100 largest cities in the United States standard time has been adopted by seventy-eight of them. The three notable ones that continue without it are Cincinnati, Cleveland and Detroit.

The Milling World's Observatory

WHAT MINNEAPOLIS MILLERS WILL PAY FOR WHEAT.

A correspondent of the St. Louis *Globe-Democrat* says: The Millers' Association has again lowered the standard of prices, and the drop is a big one. The latest prices sent to its buyers are as follows: No. 1 hard, 77 cents in Minneapolis; No. 2 hard, 74 cents; No. 1, 72 cents; No. 2, 69 cents. Prices in the country are to be based on the above, the difference being freight and handling charges. This means 62 cents for No. 1 hard wheat at points 250 to 300 miles distant; 57c. for No. 1 and 54c. for No. 2, the Chicago's peculiar grade. It will be observed that the above prices, as compared with the first list sent out by the Association, presents some curious features. The price of No. 1 hard is reduced from 85c to 77c, while No. 1 is reduced from 75c to 72. The difference between No. 1 hard and No. 1 regular is, by the latest revision, only 5 cents. The difference between No. 2 hard and No. 1 regular is only 2 cents, while No. 2 is only reduced 1 cent, making the difference between that and No. 1 regular 3 cents. Last spring the Millers' Association, with a flourish of trumpets announced that 10c per bushel more would be given for No. 1 hard wheat than for No. 2 soft this season, and urged farmers to sow hard seed. No doubt the Association meant to do as it promised, as the first price list sent out made that difference between hard and soft wheat; but at the meeting of the Northwestern buyers, last Tuesday, the Southern buyers objected so vigorously that the Association was compelled to promise to revise its figures. The present plan of the Association is evidently to fix prices of soft wheat here on a shipping basis to Chicago, and to raise the price of hard wheat barely sufficient to keep it from going by. It is doubtful if this scheme will work successfully. The Duluth market will undoubtedly fix the price of hard wheat on all the roads, and in order to keep the wheat from going there Duluth prices must be paid.

It is freely claimed by commisson men that at the present price the Association can not keep the hard wheat from going outside. Dealers can afford to give more and ship the wheat to Eastern markets and sell it by sample. In response to an invitation from the Duluth Board of Trade a committee, representing the Minneapolis Chamber of Commerce and the Millers' Association, left to-night for that city. The object of the meeting is to discuss the question of grades and to establish a uniform system between the two cities. There was a great deal of complaint last year about the difference in grades between Duluth and Minneapolis, and the commission men of both cities are in favor of a uniform system by which wheat shipped from one place to another will grade alike in both. The Duluth inspection allows nothing for dirt, but dirty wheat is placed in a low grade. The rules of the Minneapolis Chamber of Commerce do not provide for dockage on this account, but it has been the custom to do so in deference to the wishes of the Millers' Association. In no other city is wheat graded with an allowance of so many pounds per bushel for dirt, and an effort will probably be made this year to insist on a more rigid inspection in this respect. If a uniform system of grades is established between Duluth and Minneapolis, this point will have to be settled first. In veiw of the multiplication of competing lines, the prospective abundance of the crop and the prevailing low prices, the Manitoba and Northern Pacific Companies have decided on certain freight reductions on the Manitoba. They begin at points a little less than a hundred miles distant from St. Paul and Minneapolis. These are on lime, salt, cement, plaster, flour, bran, millstuffs and all kinds of grain 2 to 4 cents per 100 pounds. On the Northern Pacific the reduction begins at Sauk Rapids and Morris. It is estimated that on the lines of roads mentioned the farmers will save on grain alone $200,000 on the Manitoba and $175,000 on the Northern Pacific. Last season the Manitoba moved 19,600,000 bushels of wheat, and this year they expect to handle 28,000,000 bushels.

Notes from the Mills.

Hillsboro, Dak., wants a mill.

Castlewood, Dak., wants a flour mill.

A hundred barrel flour mill will probably be built at LaMoure, Da., this fall.

Allowing for falling-off, the rice crop of Louisiana will amount this year to 250,000 barrels.

The oatmeal mill in Cedar Falls, Iowa, has shut down, and will not resume until next month.

Washburn, Minn., is to have an eight hundred thousand bushel elevator. It wil be built the coming winter.

The Denton Mill and Elevator Company has been incorporated at Denton, Texas, with a capital of $25,000.

At Greene, Ia., Aug. 8, Dellinger's flouring mill was destroyed by fire. The loss is $25,000; insurance, $13,000.

W. T. Ross & Co., Dubois, Pa., have started very successfully on the Rider system, with Rider breaks and Miller rolls.

Corl & Breake, Canton, Ohio, report their mill, running on the Rider system, as producing results second to none.

Welch & Walker, Athens, Ill., have ordered of the Miller Co. a double 7x16 roll with a perfect automatic feed, &c.

Leggate & Evarden, Centerville, Ind., have ordered one No. 2 single purifier from the Case Mfg, Co., Columbus, Ohio.

Andrew Bowling, Staunton, Va., has ordered a Gray's noiseless belt roller mill from E. P. Allis & Co., Milwaukee, Wis.

Some grain, in the shock, belonging to John McElgunn of High Forest, Minn., was burned by lightning during a recent storm.

Schroeder & Trottman, Cedarburg, Wis., will put in a Gray's noiseless belt roller mill, furnished by E. P. Allis & Co., Milwaukee, Wis.

Richter & Co., Williamstown, W. Va., have ordered a patent automatic feed for their rolls from the Case Mfg. Co., Columbus, Ohio.

The Case Mfg. Co., Columbus, O., have an order from R. M. Sims & Co., Frankfort, Ind., for two patent automatic feed for his rolls.

A. A. Cook, Chambersburg, Pa., is improving his mills by the addition of a Success water wheel, built by S. Morgan Smith, York, Pa.

K. Mullen & Co., Denver, Col., have placed an order with E. P. Allis & Co., Milwaukee, Wis., for another Gray's noiseless belt roller mill.

J. R. Stauffer & Co., Scottdale, Pa., has placed an order with E. P. Allis & Co., Milwaukee, Wis., for a Gray's noiseless belt roller mill.

E. P. Allis & Co., Milwaukee, Wis., have an order from F. A. & S. L. Bean, Fahbane, Minn., for a Gray's noiseless belt roller mill.

J. B. Widner, Keyser, Va., has lately placed an order with the Case Mfg. Co., Columbus, O., for two pair of rolls with patent automatic feed.

An order from Henry Grape, Hamburg, Iowa, for eight sets of rolls with automatic feed has been given to the Case Mfg. Co., Columbus, O.

An order from James Comming, Lyn, Ontario, Canada, for one Little Giant break machine has been received by the Case Mfg. Co., Columbus, O.

Chas. F. Neeson, Sedalia, Mo., will put in six pairs of Allis rolls in Gray's noiseless belt frames, furnished by E. P. Allis & Co., Milwaukee, Wis.

Through Thayer Mfg. Co., Westerville, Ohio, a Gray's noiseless belt mill, from E. P. Allis & Co., will be furnished Hembel & Sons, Greenfield, Mo.

A. P. Dike, Kidmorer, Mo., has placed an order with the Case Mfg. Co., Columbus, Ohio, for four sets of rolls with automatic feed and other machinery.

Chas. E. Hall & Co., Indianapolis, Ind., have placed an order for four pairs of Allis rolls, in Gray's noiseless belt frames, with E. P. Allis & Co., Milwaukee, Wis.

It is announced that the Shuler Bros., well known and quite extensive millers at Lyons, N. Y., have assigned with liabilities placed at $70,000 and assets $45,000.

Manitoba expects to have 7,000,000 to 9,000,000 bushels of wheat to export. The Canadian Pacific rate on this by the lakes to Montreal will be 27½ cents per bushel.

John Wisener, Barnesville, Ohio, has started his mill on the Rider system. The best of results are reported from the start. Rider breaks and Miller rolls are used.

Funnel Bros. & Co., Bigstone City, D. T., have placed an order with E. P. Allis & Co., Milwaukee, Wis., for seven pairs of Allis rolls in Gray's noiseless belt frames.

The Case Mfg. Co., Columbus, O., report their foreign trade rapidly on the increase. They have recently received orders from Europe for 93 sets of rolls besides a number of purifiers.

The committee on grain of the New York Produce Exchange, has decided that "any corn meeting the requirements of the No. 2 corn will be graded 'No. 2' whether new or old."

I. O. Bachtell, Auburn, Ind., has started his mill on the Rider system. He reports the best kind of results from the very starting of the mill. Rider breaks and Miller rolls are used.

Through the Richmond City Mill Works, E. P. Allis & Co., Milwaukee, Wis., have received an order for a Gray's noiseless belt roller mill for Messrs. Logan & Logan, Shelbyville, Ky.

G. N. Horn, Hyndman, Pa., has placed his order with S. Morgan Smith, of York, Pa., for two turbines and all the machinery for a three-run grist mill complete to do first-class work.

In order to encourage the erection of grist mills near the Pitt and Carlton reserves in the North-west, the Indian department at Ottawa offers a bonus of $1,500 for a mill near each reserve.

The United States consumes about 150,000,000 pounds of starch per annum, and exports a considerable quantity besides. Indiana produces about a third of all the corn starch made in this country.

Work on Cooper's new grist mill, at Belleville, Ont., is being rapidly pushed ahead. The building will be the same size as the one burned, and the machinery will be much the same as that used in the old mill.

The Case Mfg. Co., Columbus, Ohio, have an order from Shanower & Thomas, Plymouth, Ind., for a complete outfit of rolls, purifiers, scalping reels, bolting chest, &c., for a full roller mill on the Case system.

The Case Mfg. Co., Columbus, Ohio, have secured the contract of L. D. Lenerd, Empire, Wis., for a full line of breaks, rolls, purifiers, centrifugals, reels, &c., for a gradual reduction mill on the Case system.

The Case Mfg. Co., Columbus, Ohio, will be represented at the New Orleans exposition by the Simpson & Gault Mfg. Co., of Cincinnati, O. A full line of the Case machinery with patent automatic feed will be shown.

About a million more bushels of grain arrived at Montreal through canals since the 6th of June, than in the corresponding period last year. This result is attributed to the reduction of tolls and harbor dues by the Government.

Near Ottawa, Ohio, Aug. 13, the granary of J. B. Agner caught fire and was burned to the ground, consuming 100 bushels of wheat, many tons of hay, a large straw pile and a separator, amounting in the aggregate to $2,000.

A joint stock company has been formed at Montgomery City, Mo., with $20,000 cash capital to build a new mill. The work of erecting the building is to be commenced immediately. The name of the new firm is the Merchants' Milling Company.

On the 11th inst. the Case Mfg. Co., Columbus, O., received orders for four complete all roll mills, being 52 sets of rolls, 10 purifiers, and 8 centrifugals. This is good enough for one day, yet on the following day they received an order from Europe for 45 sets of rolls.

D. Waugh, of Willsburg, W. Va., after thoroughly examining all the different processes of milling, concluded that the Rider system was the best for him, and gave the Miller Co. an order full line of Rider breaks and Miller rolls, to for a change his mill to the Rider system.

Jos. Smith, Sherodsville, Ohio, after looking carefully over all the different systems of milling, concluded that the Rider system was the best, and therefore gave the Miller Co. a contract for a full line of Rider breaks and Miller rolls, to change his mill to the Rider system.

The rumored sale of the Atlantic flour mill, St. Louis, proved to be without foundation. This mill is valuable property, and as milling is now yielding excellent returns, it is more than probable that arrangements will be consummated in a few weeks that will put it in operation.

Orr & Simmons, of Germano, Ohio, concluded after looking over the different systems of milling, that the Rider system was superior to others for his purposes, and gave the Miller Co. an order for a full line of Rider breaks and Miller rolls, to change their mill to a full roller mill on the Rider system.

The Planet mills, Litchfield, Ill., until recently owned and operated by the D. L. Wing Milling Company, which not long since made an assignment, have started up under the management of the Planet Milling Company, which has secured a lease on the property. It has a capacity of 2,000 barrels of flour in twenty-four hours.

At Chicago, Aug. 8, the firm of Rambo Bros. began a $15,000 assumsit suit against the Millers' Insurance Company, of Illinois. The suit grows out of a fire which some time since destroyed the extensive mill of the plaintiffs, at Dresden, O. The Harrison National Bank, Cadiz, Ohio, has a mortgage on the burnt property, and is also interested in the suit.

W. H. Foreman, of St. Louis, will have charge of a line of the Case Mfg. Co.'s machines, including the Bismarck 4-roll mill with patent automatic feed, the "Case" double and single purifiers, and the "Case" 3-roll 1st and 2d break machine, on exhibition at the St. Louis Exposition. The Case Mfg. Co. will have a fine display of splendidly constructed machinery, and millers visiting the exposition will do well to give at their intelligent inspection.

The Zumbro, Minn., flouring mill has been purchased by John J. Fulkerson. The mill is undergoing repairs and will be ready to start about September 1. Frank H. Allen, who has had a dozen years' experience with the late proprietor, J. M. Cole, will have the general supervision of the business. The necessary repairs are quite extensive, owing to the damage done to the mill by the cyclone of last year, and the carrying away of the dam by the spring freshet.

A heavy mill fire is reported from Anoka, Minn. A conflagration which almost destroyed the whole city, and involved a loss of over one million dollars. Among the losses is the Lincoln flouring mill with a capacity of 300 barrels daily, costing $120,000. The Anoka mill, valued at $45,000, was also completely destroyed. Both mills were owned by W. D. Washburn, and insured. The fire is, according to general belief in Anoka, the work of incendiaries, growing out of personal malice by a number of young ruffians against the manager of the skating rink, where the fire originated. This is the fourth time in its history that the city of Anoka has been fire stricken, and the second time that the entire business portion has been wiped out of existence. A drenching rain fortunately set in, otherwise the rest of the city would also have been consumed by the fiery element.

"It is now," says the Chicago *Tribune* of Aug. 14, "nearly six years since wheat sold as low in this market as it did yesterday. The lowest point was touched Oct. 19, 1878. It may be interesting to compare the lowest prices of then and yesterday:

	Oct. 13, 1878.	Aug. 12, 1884.
No. 2 spring	77	77¼
No. 3 "	63	67
No. 2 red	84¼	82
No. 3 red	74	74
Lake to Buffalo	.03	.02
Lake and canal to New York	.12¼	.06¾

"The prices of wheat now and then were the lowest of any previous year since 1870, and in that year the minimum price was 76¾c, or but a small fraction lower than now. It should be observed that freight rates were higher both in 1870 and 1878 than now, so that the present cost to the buyer at the seaboard is less than in any of the previous years. It may be observed, too, that the premium on red wheat was greater then than now; in fact, it has been irregularly shrinking for years past, a fact which is probably due, in most part, to the introduction of patent processes in milling."

A meeting of all the grain buyers of Southern Minnesota and Southern Dakota was held at the office of the Millers' Association at Minneapolis on the 13th inst. The following firms and elevator companies were represented: The Pratt Elevator company on the Hastings & Dakota road; Pillsbury & Hurlbut Elevator company and the Minnesota Grain Dealers' Association, on the Manitoba; Pacific Elevator company, on the Minneapolis & St. Louis; G. W. Van Dusen & Co., on the Winona & St Peter; Peavy & Co., on the Omaha; Cargill Bros., on the Iowa & Minnesota. In addition to these there were the buyers of the millers' association beside many individual buyers on the various roads. The meeting was for the ostensible purpose of arranging a system of dockage and weighing, and to arrange a systematic plan of action. Prices were also discussed, and were, in fact, the real object of the meeting. Those present were extremely reticent on the subject, and would not divulge what was done. It was learned, however, that the general sentiment of the buyers present was in favor of starting in on the new crop at bottom prices, and to avoid, if possible, the mistake of last year in starting too high. The prices established by the Millers' Association were discussed, and it was generally agreed that a further reduction will have to be made soon. It is understood that the Millers' Association did not renew its contracts with the buyers on the transit roads, but a general understanding was arrived at by which the association can obtain the supplies it may need from those roads through the regular buyers. The association will probably keep its own buyers on the Manitoba road alone, and trust to the ordinary means of obtaining supplies from the other lines. The Northern Pacific will be left to the Northern Pacific Elevator company, which is practically owned by the association, but the association itself will not attempt to control prices on that line.

From Foreign Lands

BAKING QUALITIES OF FLOUR.

THE following extract is taken from a work on flour, published in the Spanish by Prof. Fernando Aramburu, of Madrid.

"The method here described, of testing flour in order to determine its properties in the shortest possible time, I have tried on products of every grade, and have invariably found the results, as shown by the microscope, to indicate the value of the material tested for baking purposes. For the experiment the smallest possible amount of flour should be taken upon the point of a penknife and placed in a drop of water on the glass of the instrument. Care should be had not to get too much flour, as in that case a dough-like substance will be formed, where as the flour particles should float separately in the water. By a slight pressure of the glass above the flour and water, a portion of the latter flows off, always leaving the remaining substance in characteristic shapes, by which its quality may at once be seen. In testing good flour, the gluten, which seems to be surrounded and protected by the starch particles, appears to change its texture visibly when it comes into contact with the water. Extending and branching out in all directions, it envelops the starch particles which come in its way and forms a net-like web on the glass. This shape it preserves long after the water has evaporated, though the network breaks or shrinks in its weakest points, or those least perceptible by the microscope. The whole mass is uniform in color, showing neither grains nor spots. .

"Medium flours develop more slowly under the test. The gluten extends, but more gradually, seeming to lack power, and the particles of starch cling with much tenacity to each other. Such flour does not form a uniform net, but presents accumulations of starch containing yellow masses of fatty or slimy elements which have not been set in motion by contact with the water, as is the case in good products. Under this test poor flour collects in lumps as it absorbs the water, showing no ability in the gluten to stretch out or envelop the starch particles. Thus the starch, the gluten and the bran remain for the most part distinct, forming webs or tough threads only in a few points, and those of small extent. After evaporation of the water used, the small tendency to cohesion previously shown disappears entirely. Such flour seems to give weight to bread, and the starch it contains is nutritious. But for products intended for long preservation it is unfit, uniting with water only by mechanical mixture, and being thus liable to develop fungus and bring on diseases, the cause of which can only be conjectured."

BREAD BAKING BY MACHINERY IN LONDON.

The *Miller* says: Another has been added to the list of London bakeries now fitted with machinery. This is in the densely populated vicinity of Smithfield, in Charterhouse street, and is the property of the Milk Brown Bread Bakery Company. This company consists of gentlemen of the town of Hull, who, encouraged by their success there, have opened several places in London, of which the Smithfield bakery is the center. This is under the management of Mr. Oliver, of Morpeth, where he has lived for many years and carried on both the milling and baking trades largely. One of the special features of this new bakery is in the ovens. They are the new Bailey & Baker's continuous baking ovens, and were erected by the patentees. In this bakery three of them are employed, and have even surpassed Mr. Oliver's expectations of their suitability for the bread, small goods, and confectionery. A speciality of this company is their milk brown bread, and the success of the ovens for it Mr. Oliver pronounces very remarkable. The advantages claimed for these ovens are the small amount of fuel required, on account of there being no loss of heat, and the perfect control the baker has over the temperature; as a solid heat can be maintained without re-firing throughout the whole day, or a flash heat obtained at any moment while the oven is in use. The baking goes on continuously, and the oven is perfectly clean. Next the oven is the Otto 3½-horse power engine driving the mixing, kneading, and other machines, which are placed on the opposite side of the bakery facing the ovens. Nearest the entrance door stands the Thomson dough kneader. The capacity is 1½ sacks. In line and next to this is a Morton cake-making machine, and after this a power Cadisch whisk, which is the whisk at present principally in use by three of the four working bakeries at the Health Exhibition. A Baker's patent currant cleaning machine and a gas hot-plate for muffins complete the plant. In the room overhead there is a Baker's patent sifting and mixing machine.

PRICES OF WHEAT IN GREAT BRITAIN.

The present low price of wheat in Great Britain naturally attracts attention to the subject of values in the past. The *London Economist* publishes statistics showing the average price of British wheat for each year for one hundred and four years, showing that in 1780 the lowest price on record was made, the average for that year being 36s per quarter, equivalent to about $1.22½ per bushel; it has never been as cheap since, but there have been wide fluctuations in value, the highest price being in the year 1812, when 126s 6d was the average, equal to about $3.95 per bushel. These extreme prices have little relevancy to values in later years, because the methods of business and the sources of supply have changed so essentially, but they are interesting as matters of history, and as history repeats itself in a general although not in a specific way, notwithstanding constant changes in conditions and circumstances, it is quite possible that there will be as great extremes in the value of wheat in the future. In fact the price of wheat in Great Britain now is very nearly as low as it was in 1780, the average price last week being officially reported at 37s 6d per quarter, and new wheat as low as 36s. The reports of the European wheat crop indicate a yield above the average, and the *Economist* leans to the opinion that prices will not improve, but that it is not improbable that the average for the year 1884 will be the lowest in the history of the trade.

THE BRITISH PATENT OFFICE REPORT.

The first report of the Comptroller General of Patents, etc., under the new law has been issued. The most striking fact of the report is the record of the sudden pressure thrown upon the Patent Office during the first month of the year, when cheap patents became available. The applications during January numbered 2,499; whereas the previous average for the month was about 500. Not only was the number of applications increased fivefold, but the work on them was much heavier; for the provisional specifications were not merely pigeonholed, as formerly, but were all examined, and in many instances amendments were introduced at the suggestion or by the requirement of the examiners. During the four months covered by the report the total number of applications made was 7,060. The expectations of those who imagined that the new law would dispense with agents are not justified by the facts; for 72 per cent of the applications still pass through the hands of patent agents. The preparation for the publication of an illustrated official journal is progressing, but owing to a difficulty experienced by the officials in selecting from the inventors' drawings appropriate views for publication, and the opposition of the solicitors to furnishing special drawings on a reduced scale for the publication, the Patent Office has not yet commenced the publication of illustrations in the official journal, and thus the most interesting portion of an *Official Gazette* is omitted in the English publication.

NOTES.

The elevators of Budapest, Austro-Hungary, are to be lighted with electricity.

A quarter of Egyptian wheat, we are told, can be purchased in Liverpool for less than is paid in Alexandria by the fellah for local consumption, owing to the exorbitant local dues exacted.

Mr. John Hill's flour mills at Durham, Great Britain, will be converted into complete roller mills. Mr. J. Hill has given the order to Messrs Seck Bros., London, for the complete erection.

The continued erection of roller plants throughout England in districts where English wheat is largely used shows that the doubt of their suitability for treating these wheats is rapidly dying out.

Mr. H. Devolder of Deynze (Belgium) whose mills were started about a year ago on Seck Bros' roller system, has given another repeat order to the same firm, to increase considerably the present output of his mill.

It was decided, in a case before Justice Denman, at Cambridge, England, that a buyer is justified in rejecting grain purchased on sample, if the bulk be not equal to sample, even if, as in this case, the first buyer had re-sold the grain and forwarded it on to his buyer without first testing it.

Several districts of South Russia are suffering from the frightful ravages committed by locusts. The peasants in the district of Elizavetgard have just received 17,000 roubles from the Imperial Agricultural Society as a reward for the destruction of nearly two millions of the pestilential insects.

The Trading company of England (limited) is announced with a capital of £100,000 in £2 shares. The object of the company is to buy grain at New York and Chicago, as an investment, when prices are low, and to hold the same until a profit can be realized. The office of the company is at 7 Union Court, Old Broad Street, London.

Foreign dispatches state: "In consequence of the terrible shipwrecks which have occurred at Skagerrack the proposal has long been ventilated of piercing the Danish promontory by a canal and so avoiding this dread navigation. The proposal has now taken definite shape and surveys have been completed for a canal from the German Ocean to the Baltic Sea."

According to a recent report the female schools of Scotland are to have the benefit of more general and systematic instruction in cookery than they have yet received. The Committee of Council on Education have made arrangements in various sections of the country for giving girls in the last years of their stay at school practical instruction in this subject. According to the report there are now thirty-six schools in Scotland in which cookery is taught.

Mr. G. Lemire advices French millers, in a recent issue of the Paris *Journal de la Meunerie*, to adopt at once a mixed system of stones and rolls, as the cheapest method of meeting the growing competition of roller made flour; and he pins his faith on porcelain rolls for middlings, after a first break on iron rolls, and high grinding by stones. His opinion is that it is only a question of time, for a complete change of system to take place in French mills; French millers seem, indeed, to us to be in about the same position with regard to roller milling that English millers were about three years ago. Whether the state of progress in France will be as great as it has been in England remains to be seen.

On the morning of Sunday, July 27, a fire was discovered in the large mills at Rormadda, near Limerick, which are in the occupation of Messrs. P. Johnstone and Sons. Three fire brigades were soon on the post, but they came too late to be of any assistance, the fire having gained proportions against which they were powerless to cope. By four o'clock the building was completely burnt out, the total damage to the mill, plant, and stock being estimated at £16,000. The loss was partially covered by insurance. The mill was working up to the usual hour on Saturday night, viz., eleven o'clock. The cause of the fire is unknown. The mill was one of the most complete in the south of Ireland.

It is natural, says an English Exchange, that the United States and Chicago—the one being considered the great wheat producer of the world, and the other the great emporium in that part of the world for that valuable cereal—should discount the capabilities of our Indian Empire to play the part of an effective rival of the American wheat fields. Looking at the various reasons advanced by Columbia, we think the "lady does protest too much." Whether India will lay down sound wheat at Liverpool docks for less than one dollar a bushel remains to be seen; but one thing is certain, that India has become a factor in wheat competition which has enabled the millers of this country to regard America with much less alarm than was formerly the case.

As an aid to the technical training of millers in France, several models of milling machinery have been ordered for the Conservatoire des Arts-et-Metiers of Paris, one of the great technical schools of France, to illustrate M. Aime Girard's lectures on modern milling. The execution of the models, which are to be on a quarter scale, has been entrusted to MM. Brault & Teisset. The models will comprise bolters, centrifugal and otherwise, and roller mills of different types. The French Minister of Agriculture has caused a gold medal to be specially cast for presentation to Mons. Louis Lockert, editor of the *Journal de la Meunerie*, in recognition of that gentleman's organization of the milling section of this year's Concours General Agricole, or General Agricultural Exhibition.

It is stated that dividends of the Budapest milling industry will not be as high in this as in the past year. The books of the Hungarian Credit bank show profits from their mills past six months are forty per cent less than those of the corresponding time last year. Similar results are expected, with little or no variation, from all other Hungarian mills. There may be a few where the profits have been larger, but by a fair estimate the conclusion is arrived at, that the semi-annual profit of the mills this year will be only half as high as last year. This is said to be due to poor market for the fine flours, especially in England; but as this year's wheat crop is better than the last, there seems to be no reason why Budapest mills should not be able to pay a fair dividend on the invested capital at the end of the year.

In previous years they have used flour from Indian wheat here, writes the U. S. Consul at Ghent, Belgium, but the importation of such is on a steady decline, as the quality suffers largely by comparison with American flour. The cultivation of wheat, which absorbs the larger quantity of manure has notably diminished, by reason of the competition of foreign wheat, mainly American, which is imported in increasing quantities. It is evident that before long the cultivation of wheat will cease to be considered as remunerative, and doubtless will have to take the same fate as the cultivation of flax, which has totally disappeared from certain agricultural districts. The millers hereabouts have a decided preference for American red winter wheat, and they willingly pay a little more for such. Indian wheat, being very low, remains firm, and has not varied more than 50c. during the last ten months. Grain which is imported from that country is not very popular, and, as I understood, not much used, with the exception of the Kurrachee wheat, which the millers think compares very favorably with the American wheat.

The Grain and Flour Trade

Office of THE MILLING WORLD.
Buffalo, N. Y., August 20, 1884.

At last the scheme has been divulged whereby higher prices for wheat are to be secured. It has been intimated in several quarters, but the Chicago *Tribune* is the first to bodly announce it. It is proposed to have solvent farmers hold on to their crop, thus creating a scarcity in the market and naturally forcing values up, not a bad idea is it? Of course our milling friends will at once proceed to stock up before the scarcity of supplies becomes apparent, and thus be in a position to make high-priced flour from low-priced wheat. There's a bag of money in this scheme if it can only be carried out.

The *Commercial Bulletin* of this morning says: Yesterday it was rumored about that Wall street was about to take hold of wheat. There has been better buying to-day. For whose account it did not transpire. It appeared to be general. The "locals" did their full share. The shorts helped by liberal buying to cover. A more active market has been the result. The feeling is better all around. If the crop of wheat is large the price is low; the seaboard clearances foot up a larger aggregate than the average operator, whether exporter, miller or speculator, had figured for. It is reported that the farmers are holding back in disgust at the low prices they have to take for their wheat; the interior movement is letting up; the seaboard movement is lighter; the Chicago folks figure out an increase of 1,500,000 bushels in the visible supply of wheat; the previous wire talk from there prepared the public for a much larger addition; some forecasts were for an increase of 3,500,000 bushels; this was sensational, but had its influence. The cables were bearish; public advices 6c lower on spring, winter and California wheat. Private advices a little more cheerful this afternoon. The cash market is up ½@1c, with demand from exporters moderate and from millers fair. The option market opened at an advance of ⅛@¼c, further improved 1@1¼c, but closed with ⅜c of the advance lost; tone of the market finally weak.

The Oregon Pacific Railway Co., exhibited on Change to-day by their representive here, Mr. Norman S. Bentley, specimens of wheat, rye, oats, barley and grasses raised in Benton and Lynn counties, Oregon, about 125 miles south of Columbia River, in the Willamette Valley, which is now under cultivation to the extent of 250 miles, with last year a crop of wheat amounting to 9,000,000 bushels, and this year's prospects indicate still better results. The samples of white winter wheat are commented upon as representing a very handsome development; it is a kind of grain, however, with which this market has had little experience: as to grinding qualities it is classed with California wheat.

The market for flour is in much better form. The change is due to the higher ruling of wheat and the liberal clearances of flour from the seaboard. Spring wheats are scarce and held for better prices. Winter wheats are less freely offered. The demand is generally better. Buyers regard prices as low and are watching for the turn. To-day's change for the better is not admitted to be the signal for general buying, however, and the market closes quiet but firm. Rye flour is quiet and steady. Corn goods are more firmly held. Bag meal is in sellers' favor, but quiet. Mill feed is steady.

FOREIGN EXCHANGE.

The market for sterling was fairly active and steady, there being no increase in the supply of spot commercial bills and no security bills made. The posted rates closed at 4.83 for sixty days' and 4.85 for demand. The actual rates ranged: At sixty days' sight, 4.82@4.82¼; demand, 4.84¼@4.84½; cables, 4.84¾@4.85¼, and commercial, 4.80¾@4.81. Continental exchange quiet, francs, 5.22½@5.21⅞ and 5.19⅜@5.18¾; reichsmarks, 94¼@94⅜ and 94⅞@95; guilders, 39⅞ and 40⅛. The closing posted rates were:

	60 days.	80 days.
London	4 83	4 85
Paris francs	5 20	5 17½
Geneva	5 19⅜	5 16⅞
Berlin, reichsmarks	94¾	95⅜
Amsterdam, guilders	40½	40¾

BUFFALO WHEAT MARKET.

Buffalo, Aug. 19, 1884.

There has been a good milling demand for wheat the past week, receipts of new winter large and prices declining all round. No. 1 hard Duluth offered at 93c, No. 1 regular 88c. No No. 2 hard in market. No. 2 red 86c, longberry 88a.91. Old No. 1 white held at $1. Corn in fair demand, No. 2 55½a.56, No. 3 54c, sample lots 50a.53. Oats dull, though choice lot of old white was sold at 40c; new oats 33a.34c. Rye dull and nominal at 70c. Four cars of new wheat was received at Duluth Saturday and graded No. 1 hard: this is eleven days earlier than the receipts of last year, and the crop promises to be of very fine quality, though the weather for the next two weeks may prove unfavorable for harvesting and advance the price of this wheat.

JAMES S. MCGOWAN & SON.

BUFFALO MARKETS.

FLOUR—City ground clear Duluth spring $4.75@5.25; straight Duluth spring, $5.50@5.75; amber, $5.50@5.75; white winter, $5.25@5.50; new process, $6.25@6.75; Graham flour, $5.00@5.25. Western straight Minnesota bakers, $5.50@5.75; clear do, $5.00@5.50; white winter, $5.50@5.75; new process, $6.25@6.75; low grade flour, $2.50@4.00 OATMEAL—Ingersol $5.75; Bannerman's $6.00; Akron $6.25. CORNMEAL—Market steady, with a fair demand. Coarse, $1.15; fine, $1.25 per cwt. RYE FLOUR—In fair demand at $3.75@4.25. BUCKWHEAT FLOUR—Demand fair at $3.50 per cwt. WHEAT—Sales 500 bu No. 2 amber at 86c, 500 bu milling white at 89c, 500 bu longberry red at 89c, 4,500 bu old sample red at 88¾c, 4,000 bu No. 1 regular Northern Pacific at 87c, 500 bu No. 1 hard do at 93c, 500 bu do at 92½c, 4,000 bu do at 82c, and at the Call Board 5,000 bu do at September; 91c bid to arrive, 93½c asked 92½c bid October, 93c asked year. CORN—Demand fair, stock light. Sales thirteen car-loads No. 2 at 57c in store, and two do at 57½c, and five do No. 3 at 55c on track; at the Call Board 56½c was asked cash, 57c asked 56½c bid to arrive, 57c asked 55½ bid August, 56½c asked September. OATS—Old No. 2 white nominal at 40c. BARLEY—Season over; market nominal. RYE—Last sale of No. 2 Western was made at 72c.

THE BRITISH HARVEST.

The London Economist of August 9, says: Weather such as we have had this week is worth many millions a day to the country. The heavy rains of a fortnight back laid the crops in various localities, and although this is certainly no unusual occurrence, there is always the fear that warm, damp weather, will prevent ripening, and result in mildew, a rapid deterioration of the crop, which could hold its own far better standing. This week has set such doubts at rest, as far as the Southern counties are concerned, and a very large percentage of the ground has been cleared in capital condition, while in the Midland and in the North, where less has been accomplished, the prospects are much brighter than they were. Nor is it alone the wheat, oats and barley, for which this weather has been most favorable. The potatoes have escaped disease, and the hops are, in spite of the gloom which followed a cool, cloudy, wet July, looking far better than they did a fortnight ago. The question of the fruit crop was settled in April; but elsewhere all that could be done by a bright fortnight, just at the very time it was most needed, has been accomplished now.

This may be said to settle the question of remarkably cheap wheat and other grain during the remainder of the year. The time has gone by when the failure of a large portion of our harvest could give us dear wheat; and the experience of last year proves that it has also gone by when the failure of the American harvest could influence our markets sufficiently to bring back what even ten years ago were regarded as full prices. Under these circumstances, the British farmer can no longer look to the failure of his neighbors' crops for his profit. He has to face a world-wide competition, and it is weather like this which will enable him to hold his own to the best advantage. It is natural that the price of wheat should droop in a week like this; but there is no prospect of its drooping to such a further extent as would counterbalance the improvement in condition which he has secured.

We are not now going to indulge in an estimate of the magnitude of the various crops. Those best qualified to judge, in the absence of official figures, say that a larger area has raised wheat this year than last, and that the yield will consequently be increased, and somewhat less will be required from abroad; not less than we have imported in the last twelve months, but less than a recent average. But if, as appears likely we obtain a 28 to 30 bushel crop, and a large proportion of it in good condition, we shall be in a good position to select our further requirements from the surplus of America, Europe, and the East, and the prospect we drew attention to a fortnight back, that wheat in 1884 bid fair to be cheaper than at any time during the past 100 years, has grown more and more assured day by day since that time.

OUR MILLING INTERESTS.

When viewed as a whole, says the New York *Produce Exchange Reporter*, the harvest year just closed has not been a good one for millers. It opened at about 120 cents per bushel for No. 2 red winter wheat in this market as a starting basis for the marketing of a very poor crop in both quantity and quality. From that point prices irregularly declined to about 95 cents during the succeeding twelve months. It is easily enough understood how with poor wheat and such a decline, millers must have necessarily had a hard row to hoe. That so few of them succumbed to these adverse conditions, speaks well for their financial stability, especially as so many of them were under liabilities for new machinery and other improvements. But with a new wheat crop of exceptionally fine quality, and the markets starting off at a lower level of price—a level so that there does not seem to be any room for it to sink lower, the coming year bids fair to leave much better results than its predecessor. If a highly profitable year is not assured, an easy, pleasant and steady going business appears to be well guaranteed. The home and foreign demand cannot be otherwise than very large, the wheat markets bid fair to be more than usually free from speculative influences, prices are very low and not unlikely at the bottom, while large crops of all kinds and of good quality hold forth the promise of a general revival and increase of business in nearly all branches of trade and manufacturing during the year. We congratulate the milling fraternity on the brighter outlook.

The business men of Groton, Dak., offer a bonus of $3,000 to parties who will build a mill for the place.

PHENOMENAL HONESTY.

There is a cheap clothing dealer on Kearny, near California, whose confidence in mankind has received a severe setback. The other day an honest looking countryman walked into his store and said:

"You remember that second-hand overcoat I bought here for $8 yesterday?"

"Never dakes pack a nythings ven vonce solt, my frent," said the hand-me-downer.

"Oh! that's all right. I just wanted to say that I found this $500 bill sewed in the lining. Perhaps the owner may call for it."

"Of gorse he vill—he has call already, my tear frent," exclaimed the dealer, eagerly capturing the money. "You ish von honish man. Here, I gif you feefty tollar ash a revard. Dot vill pe all right."

When the honest customer got around the corner he murmured softly: "I guess I'd better take this fifty and skip up to Portland before that Sheeny tumbles to that counterfeit. It's getting mighty hard to shove the 'queer' round these parts, and that's a fact"—*Ex.*

NO CORNER ON PORK.

"Is this seat engaged?" asked a small, thin woman of a fat man in the New-Haven train the other day.

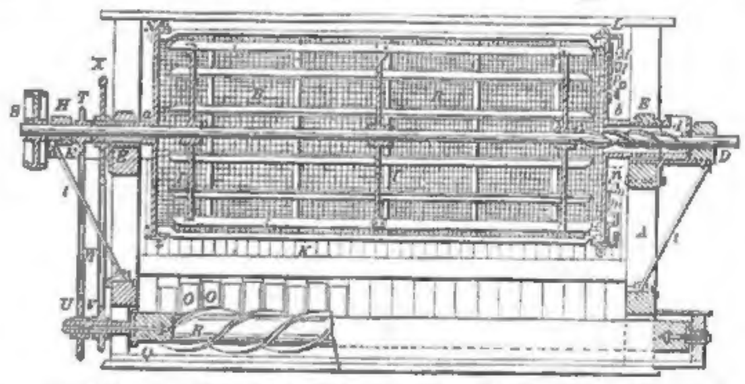
No reply.

"Will you please take your feet down and let me sit on this seat?" she repeated in a louder tone of voice.

Again no reply.

"I read to-day," she continued still louder, "that a Chicago man had cornered all the pork in the world. How did you manage to escape?"

At the next station she had the whole seat to herself.—*N. Y. Graphic*



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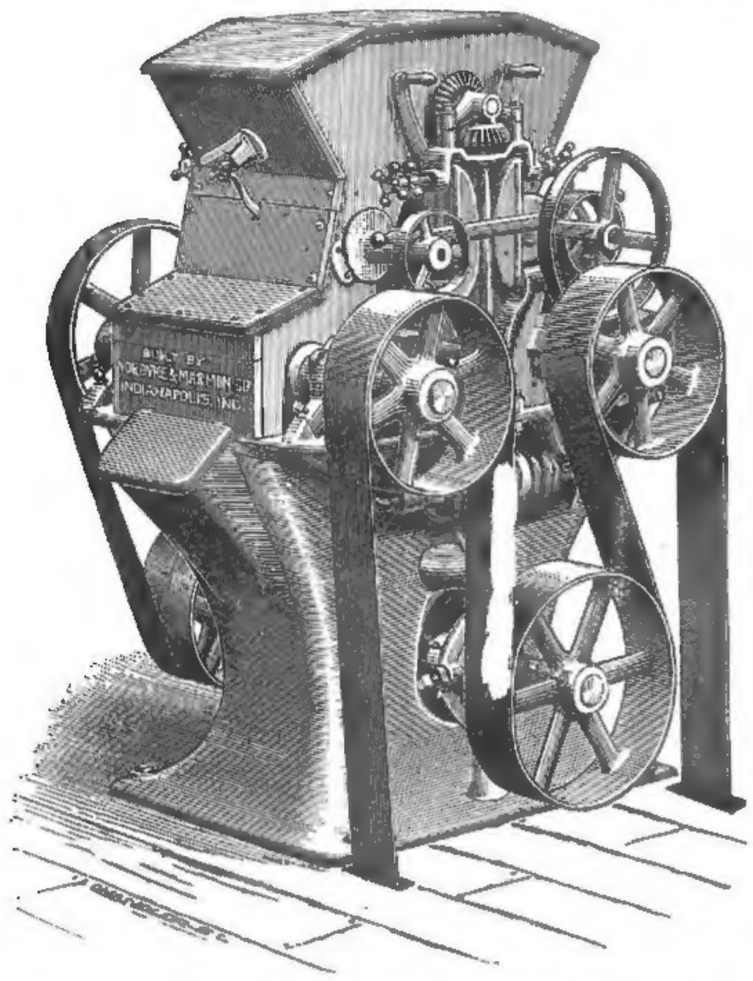
Builders from the Raw Material of

ROLLER MILLS. CENTRIFUGAL REELS, FLOUR BOLTS.

WE ARE THE SOLE OWNERS FOR THE UNITED STATES OF ALL THE PATENTS UPON THIS ROLLER MILL.



This Is the Only Roller Mill Made. Having All the Essentials Needed In Successful Milling.

500 BARREL MILL IN MISSOURI.

Read what an Old Miller who has Thirty-Four Pairs of these Rolls in Constant Use, Says:

OFFICE OF DAVIS & FAUCETT MILLING CO.,
ST. JOSEPHS, MO., Nov. 28th, 1883.

MESSRS. NORDYKE & MARMON CO., INDIANAPOLIS, IND.

Gentlemen: In regard to the workings of our new mill erected by you, will say it is working fully up to and beyond our expectations. Our average work is fully 33 per cent. over your guarantee. Since starting our mill last July we have had no complaint of our flour from any market where sold. It gives universal satisfaction, and we have it scattered on the trade from Chicago to Galveston, Texas. Our yields are all that are attainable. We have tested it on both Spring and Winter wheats with satisfactory results on both varieties. Since the mill was turned over to us we have not changed a spout or a foot of cloth, nor have we found it required to make any changes. We have run as long as six days and nights without shutting steam off the engine, not having a "choke" or a belt to come off. The mill is entirely satisfactory to us, and for a fine job of workmanship, milling skill and perfection of system, we doubt if it is surpassed in the United States to-day. It is certainly a grand monument to the ability and skill of Col. C. A. Winn, your Milling Engineer and Designer. You may point to this mill with pride and say to competitors, "You may *try* to equal, but you will never beat it." Wishing you the success that honorable dealing deserves, I am,

Yours, etc., R. H. FAUCETT, Pres.

500 BARREL MILL IN ILLINOIS.

OFFICE OF DAVID SUPPIGER & CO.,
HIGHLAND, ILL., Jan. 10, 1884.

MESSRS. NORDYKE & MARMON CO., INDIANAPOLIS, IND.

Gents: We started up our mill in June last year, and it gives us pleasure to say that your Roller Mills are doing splendid work and give us no trouble. Your milling program required no changes, and concerning yields, we get all the flour from the offals, and we sell our best grades in the principal markets of the United States at the highest prices offered for any flour. All the machinery made by you is first-class, and we would not know where to purchase as good.

Yours respectfully, DAVID SUPPIGER & CO.

125 BARREL MILL IN INDIANA.

NORDYKE & MARMON CO., INDIANAPOLIS, IND.

LAPEL, MADISON COUNTY, IND., Jan. 10, 1884.

Gentlemen: The 125 barrel All Roller mill you built us has been running all summer, and does its work perfectly. Before contracting with you for this machinery we visited many Roller Mills throughout the West and Northwest, built by the different leading mill-furnishers, and from all we could see, those built by you seemed to be giving the best satisfaction, and this is why we bought our machinery of you. Our mill comes fully up to your guarantees, and the capacity runs over your guarantees. The bran and offal is practically free from flour, and our patent and bakers' flour compares favorably with any we have seen elsewhere. I don't think anyone can beat us. Your Roller Machines are the best we have seen; they run cool, and the interior does not sweat, and cause doughing of the flour. Judging from our success, we would recommend other millers to place their orders with you.

Yours truly, J. T. FORD.

☞ Letters on file in our office from a large number of small roller millers giving as favorable reports as above. A portion will be published as occasion demands. ☜

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Mill Builders & Contractors--Guarantee Results

Motive Power and Entire Equipment of a Modern Mill Furnished under one Contract.

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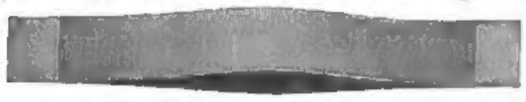

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Made of the very best double-refined English cast steel. All work guaranteed. For terms and warranty, address **GEO. W. HEARTLEY**, No. 297 St. Clair Street, Toledo, O. Send for Circular.

N. B.—All Mill Picks ground and ready for use (both old and new) before leaving the shop. No time and money lost grinding rough and newly dressed Picks. All come to hand ready for use.

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MILL PICKS.

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GOLD MEDAL—SPECIAL, 1ST ORDER OF MERIT.

Picks will be sent on 30 or 60 days' trial to any responsible Miller in the United States or Canadas, and if not superior in every respect to any other pick made in this or any other country, there will be no charge, and I will pay all express charges to and from Chicago. All my picks are made of a special steel, which is *manufactured expressly for me* at Sheffield, England. My customers can thus be assured of a good article, and share with me the profits of direct importation. References furnished from every State and Territory in the United States and Canadas.

Send for Circular and Price List.

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PRICE, 30.00.

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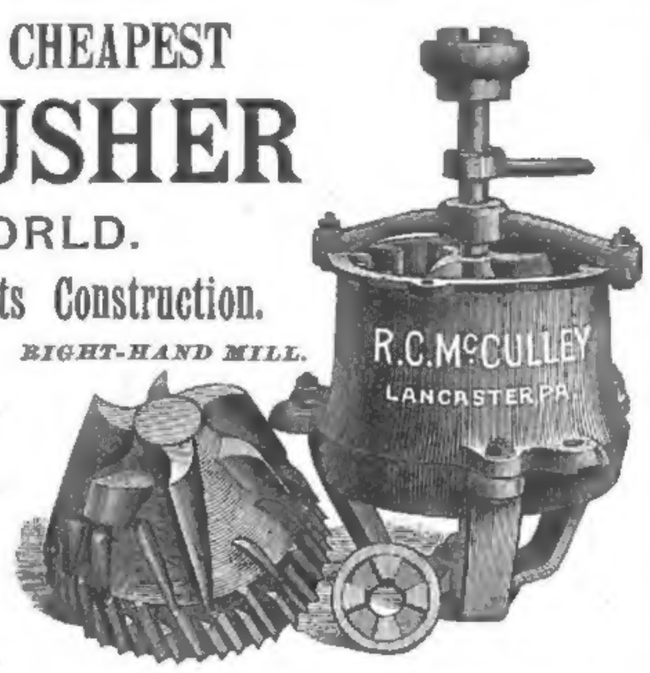

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Pulleys a Specialty, Large or Small. Address,

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The only perfect scales and registers in the world. Particularly adapted for millers' requirements.

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Beware of Infringements

We guarantee the accurate performance of the scales and registers in every case. Send for circular, and mention THE MILLING WORLD.

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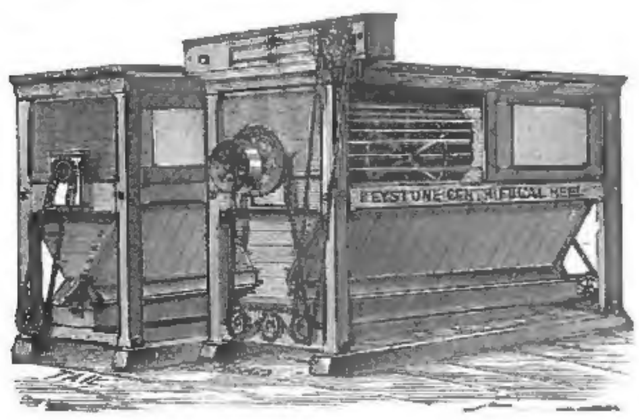

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Drag Brush Feed, Tightest Heads, Best Results. Cheapest and Best on the Market. Adapted to all Kinds of Milling. The New Drag Feed Thoroughly Protects the Silk. Sent on Trial to any Responsible Miller.

ROLLER MILLS, SCALPING REELS, PULLEYS, SHAFTING AND ALL KINDS OF MILL IRONS.

Full Stock of Dufour and Dutch Anchor Bolting Cloth.

BEST QUALITY FRENCH BURR MILLSTONES, FOR MIDDLINGS, WHEAT AND FEED.

Leather, Rubber and Cotton Belting, Smut Machines, Purifiers and everything belonging to a Flour Mill furnished at Lowest Market Prices. For Circulars, Prices and Full Particulars, address the Manufacturer,

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